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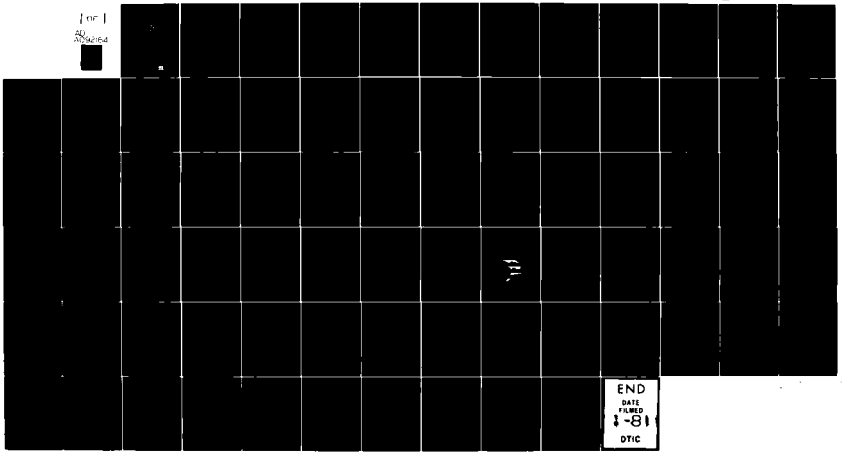

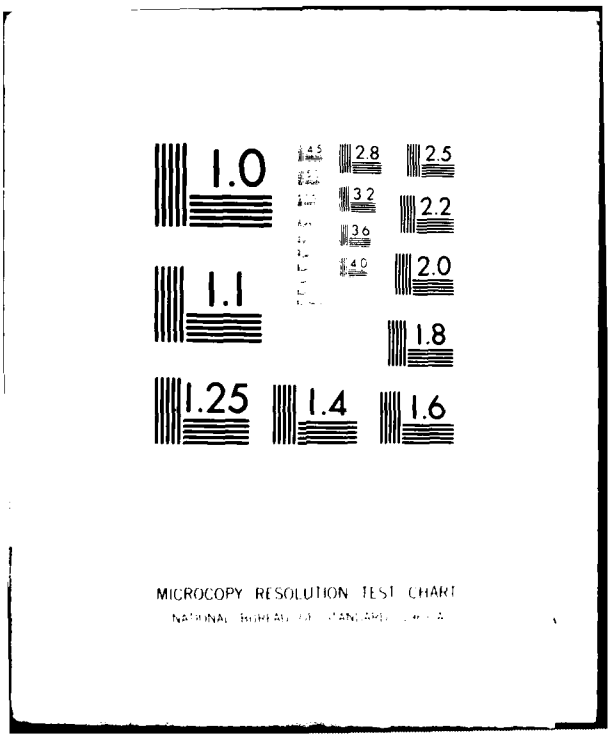
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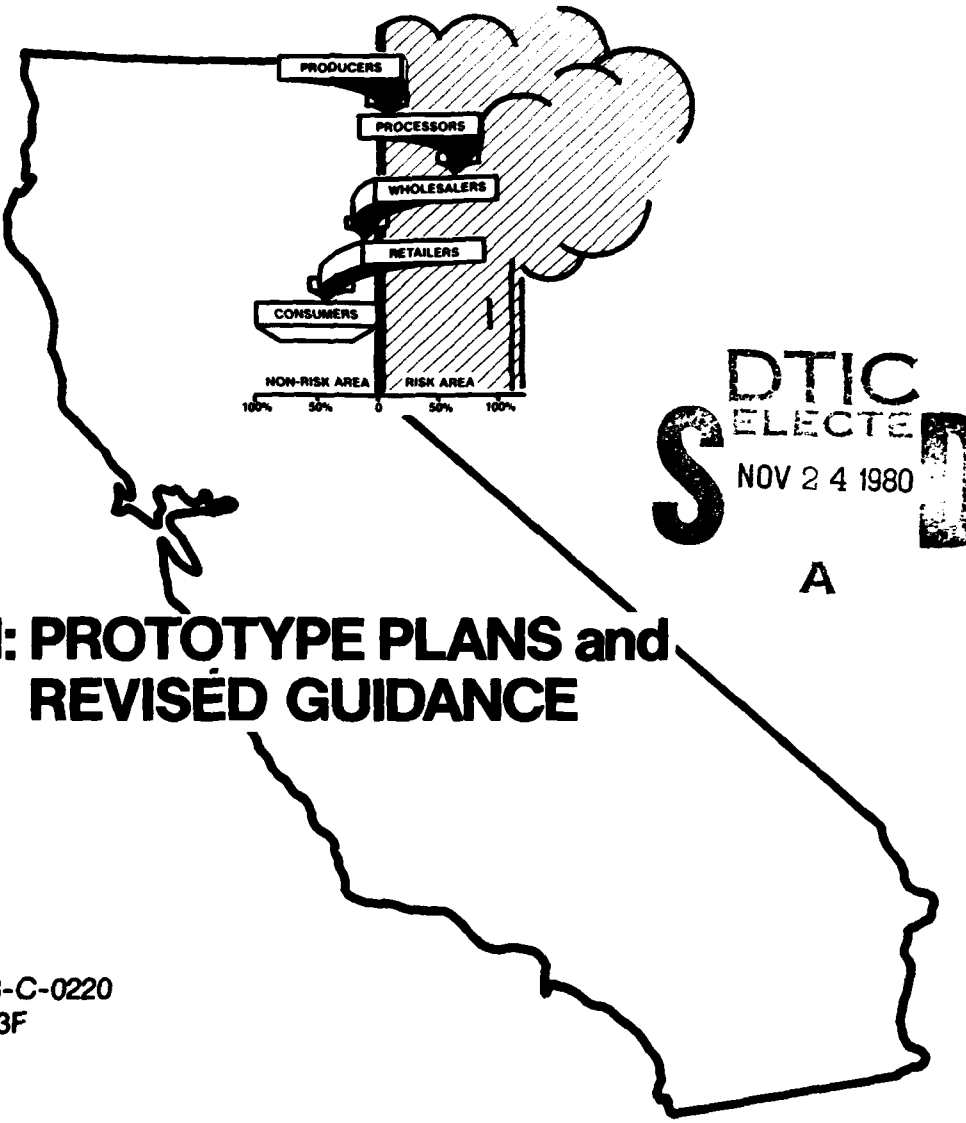
FINAL REPORT

FOOD SYSTEM SUPPORT of the RELOCATION STRATEGY in CALIFORNIA



VOLUME II: PROTOTYPE PLANS and REVISED GUIDANCE

Contract DCPA01-78-C-0220
FEMA Work Unit 2313F

September 1980

SYSTAN

FINAL REPORT

FOOD SYSTEM SUPPORT OF THE RELOCATION STRATEGY IN CALIFORNIA

Volume II: Protoype Plans and Revised Guidance

by:

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Federal Emergency Management Agency
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September, 1980

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This study extends previous research into food distribution under crisis relocation conditions by investigating detailed distribution problems in a state, California, where relocation distances are unusually long, and heavy population concentrations in threatened areas are expected to stretch the capabilities of host areas to the limit.

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The report traces the existing patterns of food distribution in California; develops and analyzes alternative strategies for redirecting the existing food distribution system to support the relocated population; investigates the transportation requirements imposed by distribution changes; drafts prototype plans for redirecting the state food distribution network in an emergency; and develops appropriate guidelines for the use of Nuclear Civil Protection planners and local officials.

Although roughly 85% of California's extensive agricultural lands are removed from direct threat of nuclear attack, only 21% of the state's food processing capacity is located in unthreatened areas. Food wholesalers, which carry between two and three weeks of food stocks, are the most vulnerable element of the distribution chain, with only 6% of these stocks likely to survive a nuclear attack undamaged. Retail grocers, with one to three weeks of inventory, are distributed in proportion to the population itself, with roughly 18% in areas free from blast effects.

It appears that the most effective strategy for food distribution under crisis relocation conditions is to allow agricultural output and major processing plants to follow normal distribution channels and to continue using risk-area wholesale facilities to serve the evacuated population. This strategy places stress on host-area retail outlets and on the transportation system linking risk-area wholesalers with the evacuated population. In California, this strategy can be expected to increase the mileage traveled in distributing food by a factor of two or three, depending on the evacuation pattern selected. This additional mileage can be accommodated by a number of actions, including those listed below:

- Encouraging selective intercompany food transfers designed to redress supply/demand imbalances;
- Assigning secondary host-area warehouse space to each major wholesale;
- Identifying instances in which drop-shipments directly from processors to host-area retailers are feasible;
- Relaxing such regulatory constraints as driver restrictions and weight limitations; and
- Improving equipment utilization by minimizing down time, relaxing maintenance requirements, eliminating light loads, shipping only full-pallet loads, and limiting shipments to essential commodities.

If these actions are taken, it appears that the transportation requirements associated with food distribution under crisis relocation conditions in California can be met with existing food industry resources and a nominal diversion of drivers and vehicles from less critical sectors of the economy.

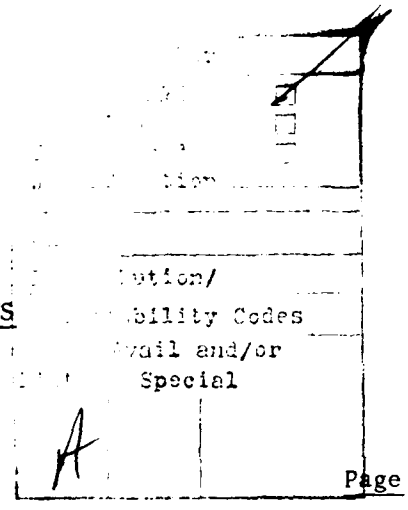


TABLE OF CONTENTS

PREFACE

This report has been prepared as one of the first in a series of studies undertaken by the Federal Emergency Management Agency (FEMA) and the California Office of Emergency Services (OES) to investigate the potential logistic problems to be encountered in implementing a strategy of crisis relocation in California. The report was prepared under Contract No. DCPA01-78-C-0220, and addresses the problems incurred in distributing food to residents evacuated from high-risk areas of the state during periods of severe international crisis. The research described in this report was accomplished over a one-year period in the Los Altos, California offices of SYSTAN, Inc. Dr. John W. Billheimer acted as project manager, while Arthur W. Simpson was principal investigator. Mr. Andrew Canfield and Ms. Gail Fondahl assisted Mr. Simpson with data processing tasks, while Ms. Carole Parker and Ms. Bracey Avery organized and edited the final report.

Technical monitors on the project were Mr. James Kerr of FEMA National Headquarters and Ms. Frances Diaz of FEMA Region VII. Mr. George Van Den Berghe of FEMA also provided technical guidance at the national level, while Jack Kearns, Loren Fields, and Orlin Orr of the California OES supplied guidance at the state level. Thanks are also extended to the many representatives of the California food industry who provided invaluable insights into the production, processing, and distribution of food throughout the state.

This report has been prepared in two volumes:

Volume I: Analysis

Volume II: Prototype Plans and Revised Guidance

SUMMARY

INTRODUCTION

Background

The movement of large masses of population from threatened target areas in advance of a potential nuclear attack will severely test the flexibility of national, state, and local food distribution systems. Past research has assessed the food requirements of the relocated populations; identified promising means of reconfiguring the existing food distribution system to meet these requirements; and developed and documented guidelines for food distribution under crisis relocation and postattack conditions. This study extends previous research efforts by investigating food distribution alternatives in a state, California, where relocation distances are unusually long, and heavy population concentrations in targeted areas are expected to stretch the capabilities of host areas to the limit.

Objectives

The objectives of this research have been to (1) trace the existing patterns of food distribution in California; (2) develop and analyze alternative strategies for reconfiguring the existing food distribution system to support the relocated population; (3) investigate the transportation requirements imposed by distribution changes and recommend means for reducing stress on the transportation system; (4) draft prototype plans for reconfiguring the state food distribution network in an emergency; and (5) develop appropriate guidelines to be used by Nuclear Civil Protection (NCP) planners and local officials in organizing and implementing food distribution under crisis relocation conditions in their jurisdictions.

RELOCATION OPTIONS

California is highly urbanized, with over 80% of its population living in areas threatened by nuclear attack. Hosting accommodations are relatively scarce outside these areas, and the average host area would have to accommodate several times its normal population under crisis relocation conditions. Four different relocation options were considered in this study:

1. Regional Hosting, a plan prepared by the California Office of Emergency Services (OES), in which areas threatened only by potential fallout are permitted to host evacuees, thereby lowering the ratio of risk area residents to host area residents (to roughly 4.5 to 1) and making it possible to assign most risk area relocatees to host areas within their own geographic regions.

2. Uniform Hosting, in which each host area accommodates exactly seven times its normal population. Since the majority (61%) of the state's residents live in Southern California, while the majority of the available low-risk areas (54%) are located in the northern portion of the state, this option imposes lengthy travel distances on many evacuees. The average distance traveled from risk to host area is 200 miles, and food distribution distances are stretched accordingly.

3. Proximity Hosting, in which evacuees are assigned only to host areas near their departure points and areas theatened by fallout in evacuation. This option results in high risk- to host-area population ratios of 12 to 1, but travel distances are correspondingly shorter.

4. Proximity Hosting with Transport Constraints. In this option, only 80% of the risk-area population is relocated, and highway capacity is a deciding factor in determining the number of people assigned to each host area.

EXISTING FOOD DISTRIBUTION PATTERNS

As a major agricultural producer, California exports more than half of its home-grown foodstuffs, particularly fruits and vegetables, to other states. In turn, the state imports significant shipments of meat and cereal products. This report traces California's food supply through the channels of distribution from producer to consumer, and assesses the vulnerability of each element to nuclear attack. Approximately 85% of California's farmland is low-risk area removed from the threat of nuclear attack, as is 21% of the state's food processing capacity. Of those foodstocks most readily available for distribution under crisis relocation conditions, California wholesalers have between two and three weeks of inventory on hand, retail grocers have between one and three weeks of inventory, and seven to ten days of supplies are estimated to be in transit to wholesale warehouses at any time. Food wholesalers are the most vulnerable element of the distribution chain. Wholesale stocks tend to be held in distribution centers in such major cities as Los Angeles, San Francisco, and San Diego, with only 6% of the state's wholesale food warehouses located in host areas. Food stockpiles under federal control are quite small, except for stocks of dry milk maintained in several risk-area locations.

DISTRIBUTION OPTIONS

A number of different alternatives for distributing food under crisis relocation conditions were identified and evaluated in terms of specific criteria encompassing set-up and maintenance costs, system disruption, attack vulnerability, operating requirements, equity, transportation stress, and system effectiveness. The results of this evaluation are reflected in the guidelines of Summary Exhibit 1. It appears that the most effective basic strategy for food distribution under crisis relocation conditions is to allow agricultural output and

Summary Exhibit I RECOMMENDED GENERAL GUIDELINES FOR PROVIDING FOOD SUPPORT FOR THE CRISIS RELOCATION STRATEGY

STATE AND REGIONAL ACTIVITIES

- Define distribution patterns for chain and independent wholesalers.
- Arrange for any additional drivers and equipment made necessary by revised distribution patterns through NDTA.
- Waive vehicle highway weight restrictions.
- Publicize waiving of HOT Driver Restrictions.

	RISK AREA ACTIVITIES	HOST AREA ACTIVITIES
FARMERS	• Continue any agricultural activity of national, regional, or local significance. Little significant agricultural production currently occurs in risk areas.	• Continue all agricultural activity.
PROCESSORS	• Continue only those processing activities that lead to production of commodities included in emergency standards and that either are national or regional in scope or command a significant share of the local market. • Encourage workers in discontinued processing activities to transfer their skills to similar host area processing facilities. • Ship excess inventory of canned goods and other dry groceries, as ordered, to host area storage points.	• Continue all food processing activity, expanding operations where possible through the use of relocated workers and unused capacity.
WHOLESALERS	• Continue to operate all chain and independent wholesale operations that command a significant (i.e., over 10%) share of the local market, following revised distribution patterns specified at state and regional level. • Empty smaller warehouses as quickly as possible, transferring goods to host area commissaries and warehouses. Encourage workers in discontinued operations to seek employment in host area warehouses. • Augment transportation fleet and driver pool as required, following guidelines and procedures established by NDTA for obtaining personnel and equipment from other sectors. • Increase vehicle and driver productivity by taking advantage of waived driver restrictions and weight limitations; minimizing down-time; relaxing maintenance requirements, increasing vehicle loads, loading only full-pallet quantities, and shipping only necessary commodities.	• Continue all food warehousing and distribution activities, expanding operations where possible through the use of commandeered space, worker overtime, and relocated workers. Transfers between different companies may be worked out as necessary. • Augment transportation fleet and driver pool as required, following guidelines and procedures established by NDTA for obtaining personnel and new equipment from other sectors. • Increase vehicle and driver productivity by taking advantage of waived driver restrictions and weight limitations, minimizing down time, relaxing maintenance requirements, increasing vehicle loads, loading only full pallet quantities, and shipping only necessary commodities.
RETAILERS	• Observe price controls & single purchase limitations established nationally during pre-crisis period and evacuation period. • As inventories & personnel permit, remain open during evacuation period. Then close operations for duration of crisis relocation period & report on remaining inventories. • Chain stores arrange for employees to transfer to chain's host area outlets for duration of emergency. Employees of independent stores should be encouraged to seek employment in host area retail outlets.	• Observe price controls, single purchase limitations, rationing plans, & coupon redemption policies established nationally during pre-crisis period & for duration of crisis relocation period. • Continue all retail food operations, expanding as required by using added personnel relocated from risk area, extending business hours, authorizing overtime work, stocking at night, and identifying and using expedient nearby storage space.
RESTAURANTS AND CATERERS	• Chain restaurants with host area outlets should transport inventories to these outlets & reassign workers to host area operations. • Fast food operations should prepare as many meals as possible during evacuation period & make them available at evacuation staging area. • Caterers should relocate all mobile food preparation equipment & as much of their inventories as possible to host area. • Institutions & stores with equipment for large-scale food preparation should transport inventories & equipment to host area.	• Restaurants & kitchen-equipped institutions should expand operations by using additional personnel relocated from risk area, enlarging seating capacity, & identifying & using expedient nearby storage space (garages, et • Large-scale mass feeding operations in kitchen-equipped institutions will be supervised by disaster agencies such as Red Cross. • Distribute food preparation equipment & incoming inventories as needed among institutions, restaurants, congregate care facilities, & private residences with cooking capacity.
CONSUMERS	• Avoid hoarding in pre-crisis period. • Transport as much non-perishable food to host area as is permitted by home stocks and mode of transportation. A one- to two week supply should suffice.	• Avoid hoarding in pre-crisis period. • Encourage host area residents to provide shelter and food to members of relocated population.
LOCALITIES	• Price regulation & liberal single purchase limitations at retail outlets during pre-crisis and evacuation periods.	• Price regulation & immediate single purchase limitations at retail outlets during pre-crisis period. • Price regulation & coupon rationing at retail outlets, restaurants, & mass feeding facilities during crisis relocation period.

major processing plants to follow normal distribution channels, and to continue using risk-area wholesale facilities to serve the evacuated population. This strategy places stress on host-area retail outlets and on the transportation system linking risk-area wholesalers with host-area retailers and mass feeding centers. In spite of this stress, the continued operation of major risk-area wholesalers is preferable to the alternative strategies considered for staging and transporting food to host areas: pre-crisis stockpiling is too costly; extensive direct shipments from processors to the host areas would disrupt existing channels and require impossible priority judgments; and heavy use of expedient host-area warehouse space is both inefficient and difficult to accomplish within a one-week time frame.

Even though the options of stockpiling direct shipments from processors to host areas and host-area warehouses are not attractive as alternatives to the basic strategy of continuing of operation risk-area warehouses, each of these options may be used to a limited extent to augment the basic strategy. Existing stocks of dried milk held under federal control should be moved from risk areas in advance of the crisis and stockpiled in selected host-area locations. A similar strategy should be followed in the case of canned goods inventories held by California processors. These processors typically have large inventories, particularly of canned fruits and vegetables, which are laid in following the harvest and drawn down during the year by shipments to all parts of the country. Removal of the sizable inventories from risk areas would reduce their vulnerability, and help to ensure the availability of food following an attack. Under normal conditions, California processors typically use railroads for out-of-state shipments and trucks for shipments to California locations. During crisis relocation, however, canned goods should be shipped by rail to host areas, where they may be stockpiled in wholesale warehouses, secondary distribution centers, intermodal transfer points, or simply left in railcars on sidings identified for that purpose.

Direct or "drop" shipments from processors to retailers can be used to a limited extent under emergency conditions. Major chains normally try to minimize such shipments because they are expensive and strain the processors' transportation capabilities. During the 1978 truckers' strike in California, however, several food distributors increased the volume of these drop-shipments to ease the strain on limited trucking resources. Under crisis relocation conditions, drop-shipments are most appropriate when the producer or processor is located in the host area and can drop-ship to wholesale, retail, or mass feeding centers nearby. The billing should be done through the distributor so that centralized control can be maintained. Even under emergency conditions, it is unlikely that drop-shipments will exceed 10% or 15% of all distributor shipments.

In California, each retail food chain and major wholesaler has been assigned secondary host-area warehouse space to be used as an adjunct to its risk-area operations. Although risk-area warehouses will continue to carry the main distribution burden, these secondary warehouses will also be used to stage deliveries to host-area stores and mass feeding

centers. Discussions with retail chain representatives indicate that certain types of nonperishable foodstuffs, particularly canned goods, can be efficiently distributed from secondary warehouse space. This option is particularly attractive in California, where host-area foodstocks are substantial and significant amounts of host-area warehouse space are available, much of it used by the food processing industry on a seasonal basis.

The use of secondary host-area warehouse space as an adjunct to primary risk-area space has the advantage of making some goods and personnel less vulnerable to attack; reducing transportation stress somewhat; and providing a base for postattack operations without unduly disrupting existing distribution patterns. In the event that the crisis is not resolved for some period of time, distributors may wish to channel more and more of their supplies through secondary host-area warehouses.

DELIVERY OPTIONS

A number of alternatives for preparing and serving food to the evacuated population have been identified and assessed in earlier research. These include the use of family residences, restaurants, institutions, and remote commissaries. Each of the alternatives will be employed to some extent under crisis relocation conditions in California. In general, small group sizes and low set-up costs are desirable features of any preparation and serving alternative. On the basis of these two criteria, family residences and restaurants would be preferable to mass feeding operations. In California, the high hosting ratios will strain the serving capacity of mass feeding facilities, so it is particularly important that family residences be used to the maximum extent possible. Other considerations, such as relative availability of homes, restaurants and institutional kitchens, the number of relocatees, the location of lodging accommodations, and the need for transportation will determine the relative attractiveness of each alternative in a specific host area.

TRANSPORTATION REQUIREMENTS

Food transportation requirements under crisis relocation conditions in California are significantly affected by the state's high hosting ratios and unique geography. Summary Exhibit 2 lists the transportation requirements imposed by a combination of alternative hosting and distribution options. Measuring transportation stress in terms of the ton-mile increase under crisis relocation conditions, the regional hosting option proposed by OES increases distribution mileage by a factor of approximately two to one over normal conditions. The uniform hosting option results in higher transportation stress (a ratio of 2.9 to 1 over normal conditions with direct warehouse shipments), and places a proportionately heavier load on mass feeding centers and congregate care facilities. If the uniform hosting strategy is replaced with a proximity hosting strategy (keeping the same risk/host definitions), it is possible to lower the transportation stress factor to 2.1, but the load on mass feeding centers increases, and the population of some southern California counties increases by a factor of 12.

SUMMARY EXHIBIT 2

TRANSPORTATION STRESS FOR CALIFORNIA FOOD DISTRIBUTION

UNDER NORMAL AND CRP CONDITIONS

Tonnage	Normal Conditions	OES Regional Hosting Option Risk/Host Ratio: 4½:1		Uniform Hosting Option Risk/Host Ratio: 7:1		Proximity Hosting Risk/Host Ratio: 7:1
		Direct Warehouse Shipments	Direct Warehouse Shipments with Intercompany Diversion	Direct Warehouse Shipments	Direct Warehouse Shipments with Intercompany Diversion	Direct Warehouse Shipments
Millions of Ton Miles/Year	1,181	2,414	2,253	3,452	2,482	2,482
Millions of Tons Shipped to Stores	12.34	9.41	11.36	8.49	10.81	8.22
Millions of Tons Shipped to Restaurants and Institutions	4.12	2.69	2.69	2.59	2.58	2.18
Millions of Tons Shipped to Mass Feeding Centers	0	4.36	2.26	5.48	3.07	6.07
Transportation Stress Factor	1.0	2.0	1.9	2.9	2.7	2.1
Additional Resources Needed						
• Tractors			1,491	3,800		
• Trailers			2,815	7,400		
• Drivers			4,239	9,100		

▱ Preferred Planning Option

Transportation stress can be reduced somewhat by encouraging selective intercompany transfers in which wholesalers with few host-area outlets ship to the stores of wholesalers with a relatively large number of host-area outlets. In California, for example, Ralph's Los Angeles warehouse should supply some of Safeway's host-area stores, while the Lucky warehouse in Vacaville should ship to some of United Grocers' host-area outlets. The limited use of drop-shipments and secondary host-area warehouses as recommended will also reduce transportation stress. Other means for reducing transportation stress include the relaxation of such regulatory constraints as driver restrictions and weight limitations, and the improvement of equipment utilization by minimizing down time, relaxing maintenance requirements, eliminating light loads, shipping only full-pallet loads, and limiting shipments to essential commodities.

Since existing transportation equipment is not used to capacity, existing distribution systems can typically support a doubling of vehicle-miles for short periods of time without requiring additional vehicles. Thus a doubling of transportation stress does not necessarily imply the need for twice as many drivers and trucks. A tripling of the stress factor might be met by doubling the driver pools and increasing the vehicle fleet by 50%. In the case of the regional hosting option proposed by OES, a detailed redistribution plan was developed for each major warehouse in California, and individual stress factors and equipment needs were estimated for each distributor. This resulted in a requirement for 1,491 additional tractors, 2,815 additional trailers, and 4,239 additional drivers. These requirements can be met readily by diverting vehicles and drivers from less critical sectors of the economy.

IMPLICATIONS OF RESEARCH ON CRISIS RELOCATION GUIDANCE

The results of the California research have been reviewed in light of the current guidance for crisis relocation planning. As a result of this review, it appears that the basic strategy proposed for food distribution under crisis relocation conditions is sound and suitable for use in highly-urbanized areas that have problems similar to those found in California. However, analysis of the food distribution system in California has brought to light several elements which should be included in the crisis relocation guidance for areas with similar characteristics. These elements include:

1. Planning for limited intercompany transfers to reduce transportation stress and balance host-area shipments;

2. Assignment of secondary warehouse space in the host areas to each major risk-area distributor, to be used as necessary to augment risk-area wholesale operations;

3. Guidelines for limited use of drop-shipments directly from processors to host-area retailers, under the central control of major distributors; and

4. Provision for rail shipments of canned goods and other dry groceries from processors' risk-area warehouses to host-area warehouses, secondary distribution centers, intermodal transfer points, or rail sidings.

Guidelines for state and local planners have been updated to reflect these elements, as well as other factors identified in extensive interviews with planners and industry personnel. These elements have also been incorporated in the food sections of prototype crisis relocation plans for California.

STATE OF CALIFORNIA

PROTOTYPE PLANS

FOR

CRISIS RELOCATION

FOOD DISTRIBUTION ANNEX

September 1980

I. MISSION

The mission of the State Food Organization is to assemble and control supplies, transportation, staging areas, and personnel needed to provide food to residents and relocatees in the State of California. This mission includes redirecting normal supply channels, monitoring deliveries, assisting in food distribution, and coordinating transportation requirements with the State Priorities Board.

II. PARTICIPATION

Federal Agencies:

U.S. Department of Agriculture (liaison only)
- State Defense Boards
- County Defense Boards
- Metropolitan Area Defense Boards

State Agencies:

California Department of Agriculture
- Area Food Organization
- County Food Coordinators
- City and Town Coordinators

Volunteer Organizations:

National Defense Transportation Association
American National Red Cross

Food Industry Representatives (State of California):

Major Wholesale Distributors
- Safeway Stores
- Alpha Beta
- Ralph's
- Market Basket
- Certified Grocers
- Market Wholesale Grocery Company
- Lucky Stores
- Von's
- Fleming Foods
- Monarch Foods

III. SITUATION

A. General Situation

1. Relocation of the risk-area population will occur only at the direction of the Governor of California. Crisis relocation of the risk-area population will be mandatory, not voluntary.

Principal transportation mode will be private vehicles over a period not to exceed three days. Population of recognized risk areas will be directed to designated host counties.

2. After relocation is accomplished, there will be no requirement for goods or services anywhere in the risk area during the relocation period, except as necessary for the preservation of property and the support of essential activities. Critical workers and their dependents will be located in host counties adjacent to risk areas, and will commute to these areas daily.

3. Once crisis relocation of the risk-area population has been directed, the minimum duration of the relocation period will be seven days. Its maximum duration is uncertain, but it could last several weeks.

B. Food Supply Guidelines

1. Essential food production and processing activities located in risk areas will continue throughout the crisis relocation period. All host-area agricultural production and processing will be continued and, where possible, expanded using the work force relocated from the risk area.

2. Major risk-area distribution warehouses operated by grocery chains, independent wholesalers, and institutional suppliers will remain in operation throughout the crisis relocation period to supply retail outlets, restaurants, and mass feeding centers located in the host area. Such major distributors may elect to operate secondary host-area distribution centers in addition to their risk-area warehouses. Changing supply patterns for these warehouses will be dictated by the State of California, acting in concert with food industry representatives. Smaller risk-area warehouses will be allowed to remain in operation if the owner so desires. Those smaller distribution centers that elect to close will be assisted in transferring their food stocks as quickly as possible to host-area distributors, who will expand operations through the use of commandeered space and relocated workers. Stockpiles of food under USDA/ASCS or Food Nutrition Service programs will be transferred from high-risk areas to host areas. Continued operation of larger risk-area warehouses and the draining of smaller warehouses may require the use of drivers and transportation equipment from other, less critical sectors of the economy.

3. Supplies to risk-area retail outlets will be cut off when the relocation order is given. Inventories permitting, these outlets will remain open during the three-day evacuation period before closing for the duration of the crisis relocation period. Any sizeable remaining inventories will be transferred to host-area outlets. Risk-area grocery clerks will be encouraged to seek employment in host-area retail outlets, which will expand operations to meet the increased demand.

4. Large-scale mass feeding operations will be established in kitchen-equipped institutions in the host area to feed relocatees in congregate care facilities. Host-area restaurants will expand operations to meet the increased demand. Relocatees lodged in private dwellings will be encouraged to eat with their host families.

5. Before the relocation order, price regulation and single-purchase limitations will be introduced to control individual food purchases in risk- and host-area retail outlets. Purchase limitations within the risk area will be set low enough to discourage individual hoarding but high enough to permit evacuees to drain risk-area retail stores before departing. Conservative purchase limitations will be established in the host area to discourage hoarding. Following the relocation order, ration coupons will be accepted at retail stores, restaurants, and mass feeding centers in the host area in payment for food purchases.

6. Risk-area evacuees will be encouraged to transport as much nonperishable food to the host area as is permitted by their available food stocks and transportation mode.

IV. AGENCY RESPONSIBILITIES

A. The USDA role in crisis relocation planning is one of liaison only. The Chairman of the USDA State Emergency Board acts as the USDA contact for liaison purposes in helping state and local civil defense officials develop plans for crisis relocation. When requested by state and local civil defense officials, the Chairman will provide information for use in developing these plans. The USDA will not establish any interstate controls over the movement of food supplies during the pre-emergency period. An understanding should be reached between state civil defense and the food industry as to alternative delivery and distribution points. USDA plans (basically Defense Food Order No. 2, which covers postattack considerations) are designed to permit the food industry (processors and wholesalers) to function with a minimum number of restrictions. In addition to these general duties, the USDA Defense Boards will:

- Maintain and update listings showing the location and size of primary food inventories;

- Authorize the release of stocks in USDA-controlled stockpiles (such as those of ASCS or the Food Nutrition Service School Lunch Program) and authorize the transfer of such stockpiles if they are in high-risk areas;

- Authorize food facilities whose stocks are under USDA control to continue food deliveries to regular customers, both intrastate and interstate and subject to the appropriate control orders, as soon as adequate state or local food rationing and distribution controls are in effect; and

- Work with local governments to obtain supplies of requisites needed for food production, processing, storage, and distribution so that the food industry can continue the orderly conduct of its regular business to the extent possible under the circumstances.

B. The California State Food Organization

The California State Food Organization is composed of representatives from the California Department of Agriculture and the food industry. On behalf of the Governor and in cooperation with other agencies of the State government and the U.S. Department of Agriculture, this organization develops policies and guidance for the control of secondary food resources (food in all retail positions, including groceries, hotels and restaurants, and institutions, except federal institutions, and homes, and the food stocks of processors such as confectioners, local delicatessens, fluid milk distributors, retail bakers, and others whose distribution is retail in nature), consistent with federal and state objectives. The purpose of these policies and guidance is to assure application throughout the state of measures compatible with national and state plans for the conservation, distribution and use of secondary inventories of food to prevent their dissipation and waste and to assure that essential needs for food are identified and met with the supplies of food available in California.

With the USDA State Emergency Board and a panel of food industry personnel, the California State Food Organization will jointly plan for the revised disposition of wholesale stocks under crisis relocation conditions.

Surplus commodity-type foods stockpiled by the California Departments of Social Welfare and Education will be subject to the same regulations as other secondary food resources. Immediately after the emergency order is issued, control of these foods will pass to the State Food Director.

The surplus commodity-type foods may be issued without charge to state or local government agencies charged with emergency mass feeding activities as required, at the discretion of the State Food Director. Distribution of such foods will be through the existing distribution system of the California Department of Social Welfare, and liaison will be established for this purpose.

The California State Food Organization, acting within the framework of the National Emergency Maximum Food Distribution Allowance, also receives and acts on requests for assistance from local government officials. After a showing of necessity and evidence of effective rationing, the USDA may be requested to arrange for additional supplies. In addition, the California State Food Organization will:

- Monitor the operation of the revised distribution system;
- Evaluate and transmit requests for additional transportation equipment and personnel to the local NDTA representative; and

- Issue all policies, orders and instructions relative to the use or sale of secondary foods.

As soon as possible after a nuclear attack, the California State Food Organization anticipates continuing future needs for food in the State, and requests the USDA to make arrangements with the primary industry to provide food to meet ongoing state needs.

C. The National Defense Transportation Association (NDTA)

In preparation for a crisis relocation movement, the NDTA will provide inventory data on transportation resources in essential and non-essential sectors of the economy, and will assist in making surveys of transportation capabilities and provide a list of industry contacts.

During a crisis relocation, the NDTA will provide staff personnel to:

- Coordinate the emergency movement of people and material;
- Coordinate the transportation of essential supplies and equipment from depots, warehouses, stores or other locations to host-area distribution points; and
- Coordinate the transportation of civil defense personnel and critical workers to and from risk and host areas.

Similar coordination activities would be carried out following an attack or a resumption of normal activities.

D. The American National Red Cross

The American National Red Cross will cooperate and assist local governments with mass feeding operations by:

- Making plans for requesting USDA/Food Nutrition Service Donated Foods through state agencies, and working with state agencies in preparing plans for the use of this food;
- Recruiting, training and assigning personnel in advance of a crisis relocation;
- Organizing volunteers;
- Planning menus to make effective use of available resources; and
- Providing support essential for mass feeding stations.

E. Major California Wholesale Distributors (see Appendix 2)

All major chain and independent wholesale distribution centers that command a significant share of any risk-area market shall continue to operate throughout the crisis relocation period, following revised distribution guidelines dictated at the state and regional levels.

In California, almost all such distribution centers are themselves located in risk areas. The major distribution centers listed in Appendix 2, Attachment 1, will be operated throughout the crisis relocation period to provide food to host-area retail outlets, distribution points, and mass feeding centers. Transfers between different companies may be worked out as necessary. Secondary host-area warehouses will be operated by the distributors as required.

United Grocers (Fresno, Richmond and Sacramento)
Market Wholesale Grocery Company (Sacramento, Fresno, Santa Rosa and Redding)
Safeway Stores, Inc. (Sacramento, Richmond, Santa Fe Springs, and San Diego)
Von's Grocery Company (El Monte)
Alpha Beta Company (La Habra and Milpitas)
Market Basket (Los Angeles)
Fleming Foods (Fremont)
Ralph's (Compton)
Lucky Stores (La Habra and Vacaville)
Certified Grocers (Los Angeles)
Monarch Institutional Foods (Los Angeles and Brisbane)

V. COORDINATION

A. Appendix 1 shows the proposed organization chart for the management of food resources under crisis relocation conditions. This chart was adapted from the emergency organization chart developed as part of the California Emergency Resources Management Plan for managing food resources in a postattack environment.

B. Locations and Telephone Numbers

The location and telephone number of representatives from each state-level element of the Appendix 1 organization chart are listed below.

STATE-LEVEL MANAGEMENT

Name	Title	Location	Telephone No.
A.R. Cunningham	Director, Office of Emergency Services	2800 Meadowview Rd. Sacramento, CA 95832	916/421-4990
Steve Delano	Chief, Administrative Support Services State Education Agency for Surplus Property Dept. of Education	721 Capitol Mall Sacramento, CA 95814	916/445-4778
Charles Listmann	Acting State Exec. Director, USDA/ASCS	2810 Chiles Road Davis, CA	916/758-4550
R.E. Rominger	Director, Dept. of Food & Agriculture	1220 N Street Sacramento, CA	916/445-9280

Joanne Ashley	President, Inland Empire Cptr. NDTA	5957 Normandie Pl. Riverside, CA 92506	714/787-9417
Philip Baffert	President, San Francisco Chapter NDTA	Pacific Motor Trucking Co. 1776 Middle Harbor Oakland, CA 94607	415/832-0672
Bellford Coursey, Jr. (LCDR, NSNR, Ret.)	President, Los Angeles Chapter NDTA	Western Airlines 6733 S. Sepulveda Los Angeles, CA 90045	213/646-8731
Donald Wilson	President, Sacramento Chapter, NDTA	T.I.M.E.-D.C., Inc. 8233 Belvedere St. Sacramento, CA 95826	916/452-7861
Harold Cassel	President, San Joaquin Valley Chapter NDTA	Associated Freight Lines 2020 Lance Street Modesto, CA 95351	209/527-4395
Tom Field	President, Alpha Beta	777 S. Harbor Blvd. Los Angeles, CA 90040	714/738-2000
James Warren, Jr.	Vice President, Distribution Ralph's	1100 W. Artesia Compton, CA 90054	213/637-1101
Ted Gottschau	Distribution Mgr. Market Basket	6014 Southeastern Ave. Los Angeles, CA 90040	213/725-3400
David Payne	Director, Public Rel. Certified Grocers	2601 Southeastern Ave. Los Angeles, CA 90040	213/726-2601
Paul Schacht	President United Grocers	1005 South 3rd St. Richmond, CA 94804	415/233-4620
Charles DeBerry	Vice President Market Wholesale Grocery Company	3440 Mendocino Ave. Santa Rosa, CA 95401	707/526-3350
Ray Sari	Vice President, Distribution Lucky Stores	6300 Clark Avenue Dublin, CA 94566	415/828-1000
Robert Hearn	Group Vice President Von's	10150 Lower Azusa Rd. El Monte, CA 90051	213/579-1400
Mel Willming	Warehouse & Transportation Manager Fleming Foods	5900 Stewart Fremont, CA 94537	415/657-8900
Borna Bajurin	Asst. Branch Manager Monarch Institutional Foods	240 Valley Drive Brisbane, CA 94005	415/467-2500

C. Communications

Communications between food processors and distribution centers, and between these centers and retail outlets, restaurants, and mass feeding points, will be primarily by telephone. Leased computer lines currently used by chain stores to transmit inventory needs to central distribution centers will continue to operate.

D. Reporting Procedures

Chain-operated food distribution centers shall continue their normal polling of host-area retail outlets throughout the crisis relocation period, and submit daily reports to the California State Food Organization. Independent host-area retail outlets and restaurants shall submit daily inventory status reports and orders to their wholesale supply centers. These supply centers will in turn submit daily reports to the California State Food Organization.

Mass feeding centers shall submit inventory and demand reports to their Host Area County Food Captains following each of the two meals served daily. Emergency situations requiring expedited food shipments shall be reported immediately to the Area Food Organization. Organization personnel shall act immediately to provide supplies in an emergency situation. In the absence of an emergency, these personnel shall summarize the reports of each host-area captain and submit a daily report on consumption, inventory levels, and project demand to the California State Food Organization.

Immediately after shutting down retail operations, risk-area retail stores shall report their remaining inventories to the District Food Management Board. Wholesale warehouses to be closed for the duration of a crisis relocation shall report the size of their inventories to the Area Food Organization immediately after the crisis relocation order is issued, in order to obtain transportation assistance in transferring their inventories to the host area.

Requests on the part of major distribution centers for additional equipment and personnel shall be submitted directly to the California State Food Organization, which shall forward such requests with recommendations for action to the Director of the Emergency Resources Management Agency. Other requests for additional equipment and personnel shall be submitted to District Food Managers before being conveyed to the California State Food Organization.

E. ACTION CHECKLIST

1. Preparatory

a. Review and update relocation plans, establishing requirements for food supplies and logistic support for these supplies within the risk and host areas after general relocation.

b. Update inventories of manpower, equipment and supplies available and plans for removal of stocks to host counties.

c. Review plans for expanding production of food products during the crisis relocation period.

d. Update plans for rechanneling statewide food flow and review key organizational relocation plans.

e. Review plans for procurement and control of food, including rationing plans.

f. Contact critical risk-area distribution centers and review plans for their operation and protection.

g. Contact and organize industrial representatives in emergency management positions.

2. Relocation

a. Inform food industry personnel of Governor's relocation order and assist in providing additional transportation for food transferral as needed.

b. Advise food industry as to which type of plants should increase production, change their product mix, or convert to other commodities to meet anticipated postattack requirements.

c. Advise small risk-area wholesalers on move to host-area space where available and appropriate. Advise processors on shipment of excess inventory to host-area storage points.

d. Provide emergency supplies of food to host-area retail outlets and mass feeding centers; shut down non-essential risk-area services.

e. Maintain control of supply and procurement of food; monitor supply and consumption levels, adjusting as necessary; supervise and assist in removing food, unneeded supplies, and equipment from risk area to host counties. Keep advised of transfers between wholesalers.

f. Serve as liaison to food industry to expedite essential products and services and act on emergency equipment requisition.

g. Serve as liaison with state regulatory agencies and transmit relevant changes in operating constraints (e.g., driver regulations and weight restrictions) to food industry.

3. Attack

   a. Upon attack warning, direct critical facilities within risk area to shut down operations and take shelter according to plans; move mobile equipment to staging areas or outside the risk area.

   b. Implement Emergency Operations Plans (EOP's) as modified by relocation conditions.

4. Postattack

   a. Assemble information on damage to food resources and stockpiles.

   b. Monitor requests for emergency supplies, expediting where necessary.

   c. Assist USDA in coordinating postattack food production and distribution activities at primary levels. Propose plans for increasing processed food output and changing commodity mix as directed by attack damage and surviving food demands.

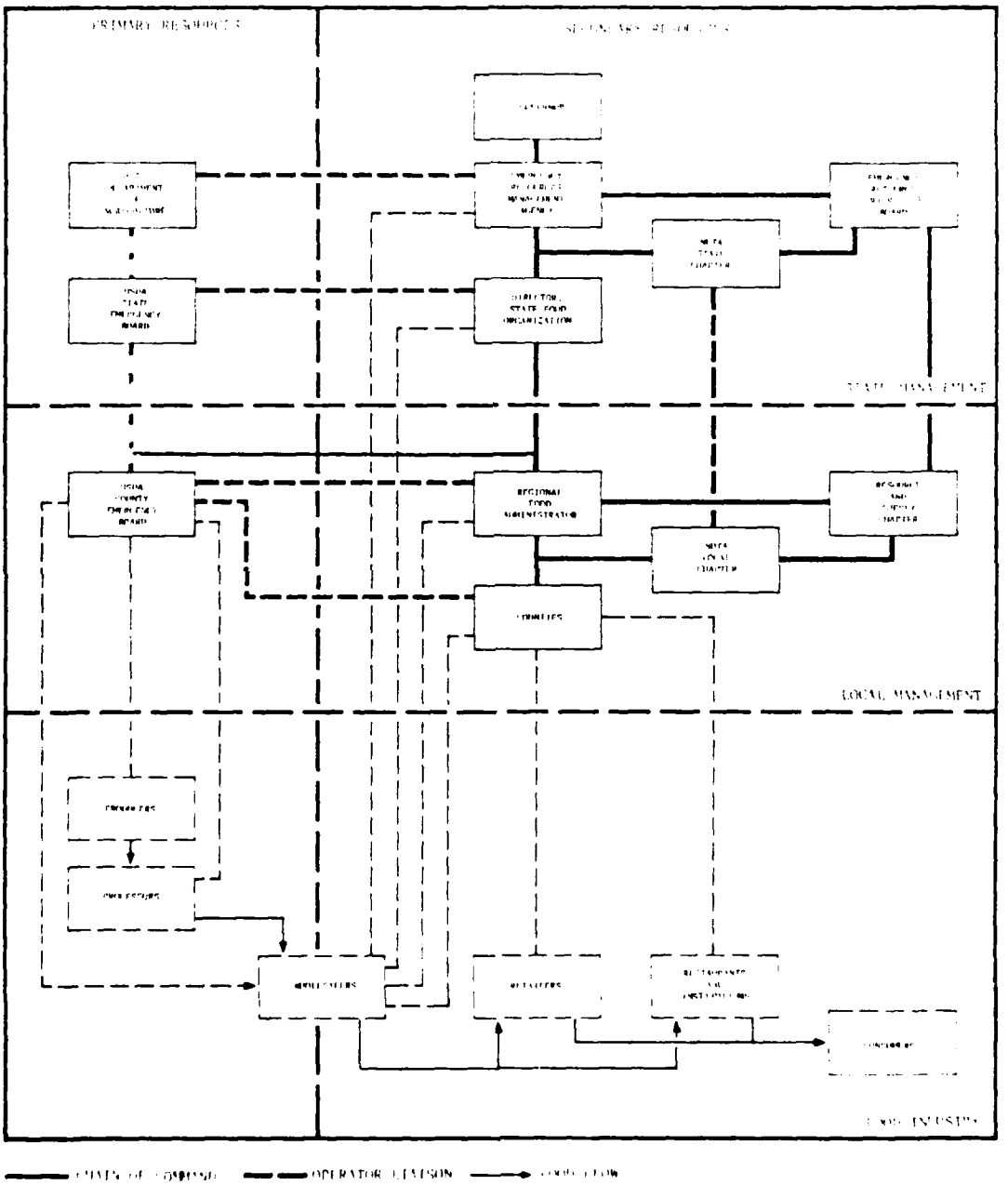
   d. Provide emergency food supplies to host-area retail outlets and mass feeding centers.

   e. Work with appropriate local civil agencies to develop, for operators of facilities having secondary food resources, the best possible distribution of items that may be in short supply (such as fuel, manpower, electric power, transportation).

   f. Distribute information on decontamination of foodstuffs and precautionary measures.

   g. Continue serving as liaison to food industry to expedite essential products and services and act on emergency equipment requisitions.

APPENDIX I: ORGANIZATION FOR MANAGEMENT OF CALIFORNIA FOOD RESOURCES



APPENDIX 2

REVISED WHOLESALE/RETAIL DISTRIBUTION GUIDELINES

Major Risk-Area Distribution Centers

All major chain and independent wholesale distribution centers that command a significant share of any risk-area market shall continue to operate throughout the crisis relocation period, following revised distribution guidelines that bypass normal risk-area outlets. In California, all such distribution centers are themselves located in risk areas. Major distribution centers will be operated throughout the crisis relocation period, to provide food to host-area retail outlets, distribution points, and mass feeding centers. Secondary host-area warehouses will be operated by the distributors as required. These are listed in Appendix 2, Attachment 1. To the extent possible, corporate identities and operating autonomy will be retained throughout the crisis relocation period.

Revised Distribution Patterns

Revised distribution patterns for each of the major distribution centers identified in Attachment 1 are outlined in Attachment 2.** This attachment identifies the risk-area counties in which retail operations are to be suspended, and specifies the host-area counties that are to receive the shipments normally destined for each risk-area county. The revised activities of each distribution center are summarized below. More detailed guidelines for each distribution center should appear in the crisis relocation plan for the appropriate risk area. Attachment 3 lists the members of USDA County Emergency Boards in California.

1. Lucky Stores, Safeway Stores, and Alpha Beta. These companies are the largest retail food chains in California, each distributing over 30,000 tons of food and other products per week. Together they account for almost half of the retail food distribution in California. Both Lucky and Safeway have a large number of stores in both the risk and host areas of California.*
2. Ralph's, Certified Grocers, Von's, and United Grocers. These four companies are in the medium-size range, each distributing between ten and twenty thousand tons per week. Together, they account for about 25 percent of California's retail food sales.

   Eighty percent of Ralph's 100 stores are located in Southern California. Most of these stores are in the Los Angeles-Orange County area, while most of the Northern California stores are located in the San Francisco Bay Area. All of Ralph's stores are in risk areas. Under crisis relocation conditions, on a limited intercompany diversion strategy, Ralph's would ship most of its throughput to Safeway, and a small quantity to mass feeding centers.

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* Exhibit 319 of Volume I, Analysis, lists the number of stores by company.

** The distribution patterns of Attachment 2 have been developed in response to the regional hosting strategy proposed by the California Office of Emergency Services (Reference 21). Any deviation from this evacuation strategy will necessitate recalculation of distribution patterns.

APPENDIX 2, ATTACHMENT 1: CALIFORNIA FOOD DISTRIBUTION CENTERS

MAJOR RISK AREA DISTRIBUTION CENTERS

DISTRIBUTOR	CITY	COUNTY
United Grocers	Fresno	Fresno
United Grocers	Richmond	Contra Costa
United Grocers	Sacramento	Sacramento
Market Wholesale	Sacramento	Sacramento
Market Wholesale	Fresno	Fresno
Market Wholesale	Santa Rosa	Sonoma
Market Wholesale*	Redding	Shasta
Safeway	Sacramento	Sacramento
Safeway	Richmond	Contra Costa
Safeway	Santa Fe Springs	Los Angeles
Safeway	San Diego	San Diego
Vons	Los Angeles	Los Angeles
Alpha Beta	La Habra	Orange
Alpha Beta	Milpitas	Santa Clara
Market Basket	Los Angeles	Los Angeles
Fleming	Fremont	Alameda
Ralph's	Compton	Los Angeles
Lucky Stores	La Habra	Orange
Lucky Stores	Vallejo	Solano
Certified	Los Angeles	Los Angeles
Others	Oakland	Alameda
Others	Los Angeles	Los Angeles
Res. & Inst.	Oakland	Alameda
Res. & Inst.	Los Angeles	Los Angeles

SECONDARY HOST AREA WAREHOUSES

ORGANIZATION	CITY	COUNTY
Warehouses	Selma	Fresno
Lucky Stores	Vacaville	Solano
Lucky Stores	Vacaville	Solano
Market Wholesale	Redding	Shasta
Warehouses	Cutler	Tulare
Warehouses	Ukiah	Mendocino
Market Wholesale	Redding	Shasta
Lucky Stores	Vacaville	Solano
Lucky Stores	Vacaville	Solano
Warehouses	Coachella	Riverside
Warehouses	Brawley	Imperial
Warehouses	Indio	Riverside
Warehouses	Tulare	Tulare
Food Processor	Gilroy	Santa Clara
Warehouse	Visalia	Tulare
Warehouse	Tracy	San Joaquin
Warehouse	Visalia	Tulare
Lucky Stores	Vacaville	Solano
Lucky Stores	Vacaville	Solano
Warehouse	San Luis Obispo	San Luis Obispo
Food Processor	Gilroy	Santa Clara
Warehouse	Livingston/ Madera	Merced Madera
Lucky Stores	Vacaville	Solano
Warehouses	Coachella/ Merced/ San Luis Obispo/ Tulare	Riverside Merced San Luis Obispo Tulare

*Host Area Location.

Certified Grocers serves independent grocers and smaller chains. Its member stores are almost all in Southern California; approximately two-thirds of its stores are in the Los Angeles-Orange County area. Under crisis relocation conditions, Certified Grocers would ship to its own host area stores, as well as to mass feeding centers.

Von's, like Ralph's and Certified Grocers, has its warehouses in Los Angeles. About eight percent of Von's 140 stores are located in a host area. Under crisis relocation conditions, Von's would ship about three-quarters of its throughput to its own stores, and the balance to mass feeding centers.

Like Certified Grocers, United grocers is a major organization serving individual grocery stores and smaller chains. United Grocers serves a large number of stores from warehouses in Richmond, Sacramento and Fresno. Although about ten percent of the stores served by the Richmond warehouse are located in host areas, more than half of those served by the warehouses in Sacramento and Fresno are located in host areas. These host-area stores are capable of handling a greater amount than the volume normally shipped by the warehouse. Therefore, under the limited intercompany diversion option, some of these stores would be supplied by Lucky's Vacaville warehouse in Northern California.

3. Market Basket, Fleming Foods, and Market Wholesale Grocery Company. These companies are the smallest of the distributors analyzed; they each handle from 5 to 100 thousand tons per week.

Market Basket is a Los Angeles-based grocery chain with about 60 stores located primarily in the Los Angeles and Orange County areas. Since it has no stores in host areas, all of its throughput would go to mass feeding centers under the uniform hosting allocation option.

Fleming Foods is a major wholesale distributor in the San Francisco Bay Area, serving a large number of independent stores and smaller chains. The company's main warehouses are in Fremont, and it leases additional space in other East Bay cities as well. An estimated 13% of the stores served by Fleming are located in host areas. Under crisis relocation conditions, shipments to these stores would be increased as required; Fleming would not ship to mass feeding centers.

Market Wholesale Grocery Company serves independent grocers and small chains in Northern and Central California from warehouses in Santa Rosa, Sacramento, Redding, and Fresno. The firm has some additional space in San Jose. About half of the stores served by this company are located in host areas. Under crisis relocation conditions, it would distribute both to its own regular customers and to mass feeding centers. Due to the large number of host-area stores served by Market Wholesale, the host-area retail throughput would be only about 2.5 times the pre-crisis level. One way to increase this throughput would be to increase the warehouse throughput by means of creating more shifts, increasing the number of days worked, making use of pallet loading, etc. In most cases, warehouse throughput could be doubled by using these methods.

Monarch Foods is the largest of several major institutional suppliers in California. Under crisis relocation conditions, Monarch could increase its supply of food to restaurants, and also supply new mass feeding centers.

Revised Operating Procedures

Personnel from each of the firms listed above have been interviewed at some length regarding potential measures for improving the productivity of warehouse staff and transportation equipment under crisis relocation conditions. Interviewees from each firm expressed the opinion that existing warehouse personnel (or, in some cases, a slightly reduced complement of necessary workers) would be equal to the task of maintaining risk-area warehouse operations throughout the crisis relocation period. The potential strain on drivers and transportation equipment was recognized as a problem, however. To alleviate this problem, several revised operating procedures were identified. They are summarized below.

1. Take advantage of relaxed regulatory constraints. In time of emergency, it is anticipated that union and DOT regulations regarding driving time will be relaxed, as well as state-imposed highway weight limitations. Firms should take advantage of these relaxed restrictions to the extent possible, commensurate with safe driving practices.

2. Improve equipment utilization. In the short term, vehicle productivity can be improved by minimizing down time and delaying routine maintenance.

3. Ship only full-pallet loads and full truck loads. During an emergency, brand sensitivity is not likely to exist among customers. Hence, loading orders should be written in terms of full-pallet loads, and all trucks should be loaded to capacity.

4. Ship only necessary commodities. Attachment 4 contains suggested shipping guidelines for reducing non-essential shipments under crisis relocation conditions.

5. Obtain additional drivers and equipment. Even with the measures described above, it is anticipated that additional transportation equipment and personnel will be needed to provide the required food distribution capability under crisis relocation conditions. Estimates of additional equipment required by each risk area distribution center appear in Attachment 2. At the start of the crisis relocation period, additional equipment and drivers will be made available to risk-area distribution centers through the NDTA. Requests for more personnel and equipment should be submitted to the California State Food Organization, which will forward the request to the Emergency Resources Management Agency.

APPENDIX 2, ATTACHMENT 2

SUMMARY OF REVISED WHOLESALE-RETAIL DISTRIBUTION PATTERNS
(continued)

PLAN FOR RALPH'S WAREHOUSE IN COMPTON

Stress level is 2.067
63 additional drivers needed

Store sales factors:
Safeway stores in:

Santa Clara	4.1	
San Diego	6.3	(3)
Fresno	5.6	
Kern	6.0	
Kings	5.3	
San Bernardino	6.3	(3)
Monterey	4.1	
Santa Barbara	5.4	
Santa Cruz	4.1	
Tulare	5.2	

PLAN FOR SAFEWAY WAREHOUSE IN SACRAMENTO

Stress level is 1.027

Store sales factors:

Inyo	5.2	(1)
Mono	5.2	(1)
Amador	3.5	
Merced	4.3	
Stanislaus	3.4	
Butte	2.3	
El Dorado	3.4	
Placer	3.4	
Tehama	3.0	
Shasta	3.2	(2)

PLAN FOR SAFEWAY WAREHOUSE IN RICHMOND

Stress level is 2.855
95 additional tractors needed
190 additional trailers needed
321 additional drivers needed

Store sales factors:

Orange	6.3	(1) (2)
Alameda	3.2	
Calaveras	4.1	(1)
Placer	3.4	(1)
Del Norte	2.1	
Humboldt	2.7	
Nevada	3.4	(1)
Lake	3.5	
Napa	3.1	
Shasta	3.2	(1) (2)
Sonoma	2.6	
Tuolumne	4.1	(1)
San Joaquin	3.8	(1)
Lassen	3.5	(1)
Mendocino	3.5	
Solano	3.2	(1)
Glenn	2.8	(1)
Siskiyou	3.2	(1)
Sutter	1.2	(1)

PLAN FOR SAFEWAY WAREHOUSE IN SANTA FE SPRINGS

Stress level is 1.164

Store sales factors:

Orange	6.3	(2)
Los Angeles	6.3	
Riverside	6.3	
San Bernardino	6.3	(3)
Ventura	6.3	

PLAN FOR SAFEWAY WAREHOUSE IN SAN DIEGO

Stress level is 1.614
4 additional drivers needed

Store sales factors:

San Diego	6.3	(3)
Imperial	6.3	

PLAN FOR UNITED GROCERS WAREHOUSE IN FRESNO

Stress level is 0.298

Store sales factors:

Fresno	5.1	(3)
Kings	4.9	

PLAN FOR UNITED GROCERS WAREHOUSE IN RICHMOND

Stress level is 1.932
25 additional drivers needed

Store sales factors:

Sacramento	2.1	(1)
Alameda	2.9	
Calaveras	3.7	
Placer	3.1	
Mono	4.8	(1)
Colusa	1.7	
Nevada	3.1	
Amador	3.2	(1)
Yuba	1.7	(1)
Napa	2.9	
Butte	2.1	(1)
El Dorado	3.1	(1)
Pluras	3.1	(1)
Sierra	3.2	(1)
Sonoma	2.4	(1) (3)
Tuolumne	3.8	(1)
San Joaquin	3.5	(1)
Mendocino	3.2	(1)
Solano	2.9	(1)
Tulare	4.8	(1) (2)
Trinity	2.9	(1)
Glenn	2.6	(1)
Yolo	2.9	(1)
Siskiyou	2.9	(1)
Sutter	1.1	(1)

(1) normally served at least partially by another warehouse
(2) served partially by another warehouse of the same company
(3) served partially by a warehouse of another company

APPENDIX 2, ATTACHMENT 2

SUMMARY OF REVISED WHOLESALE-RETAIL DISTRIBUTION PATTERNS (continued)

PLAN FOR LUCKY'S WAREHOUSE IN BUENA PARK

Stress level is 5.991
- 69 additional tractors needed
- 1703 additional trailers needed
- 1819 additional drivers needed

Store sales factors:

Sacramento	3.0	
Fresno	7.2	(1)
Madera	5.2	(1) (2)
Riverside	8.0	
San Bernardino	8.0	
Sonoma	3.3	(1)
San Joaquin	4.8	(1)
Solano	4.0	(1)
Ventura	8.0	

Shipments to mass feeding centers (tons/wk)

San Diego	9512
Riverside	6013
Imperial	1202
San Bernardino	1381

PLAN FOR MARKET BASKET WAREHOUSE IN LOS ANGELES

Stress level is 4.977
- 54 additional tractors needed
- 134 additional trailers needed
- 149 additional drivers needed

Shipments to mass feeding centers (tons/wk)

Kern	2015
Inyo	167
San Bernardino	1772
San Luis Obispo	451
Santa Barbara	997

PLAN FOR MARKET WHOLESALERS WAREHOUSE IN FRESNO

Stress level is 1.411

Store sales factors:

Fresno	2.3	(2)
Kern	2.4	
Kings	2.1	
San Luis Obispo	2.1	

PLAN FOR MARKET WHOLESALERS WAREHOUSE IN SACRAMENTO

Stress level is 2.155
- 7 additional drivers needed

Store sales factors:

Fresno	2.3	(1) (2)
Calaveras	1.6	
Placer	1.4	
Colusa	0.7	(1)
Nevada	1.4	
Amador	1.4	
Yuba	0.8	
Stanislaus	1.4	(1)
Butte	0.9	(1)
El Dorado	1.4	
Plumas	1.4	(1)
Sierra	1.4	
Tuolumne	1.6	(1)
San Joaquin	1.5	(1)
Tulare	2.1	(2)

PLAN FOR MARKET WHOLESALERS WAREHOUSE IN SANTA ROSA

Stress level is 2.631
- 4 additional tractors needed
- 4 additional trailers needed
- 11 additional drivers needed

Store sales factors:

Alameda	1.3	(1)
Mariposa	1.7	(1)
Lake	1.4	(1)
Merced	1.7	(1)
Napa	1.3	
Marin	1.5	
Sonoma	1.0	(1)
Mendocino	1.4	(1)
Solano	1.3	(1)
Tulare	2.1	(1) (2)
Trinity	1.3	(2)
Yolo	1.3	(1)

PLAN FOR MARKET WHOLESALERS WAREHOUSE IN REDDING

Stress level is 0.823

Store sales factors:

Modoc	1.4	(1)
Del Norte	0.6	
Humboldt	1.1	(1)
Tehama	1.2	(1)
Shasta	1.3	(1)
Lassen	1.4	(1)
Trinity	1.3	(2)
Glenn	1.1	(1)
Siskiyou	1.3	
Sutter	0.5	(1)

(1) normally served at least partially by another warehouse
(2) served partially by another warehouse of the same company
(3) served partially by a warehouse of another company

APPENDIX 2,ATTACHMENT 2

SUMMARY OF REVISED WHOLESALE-RETAIL DISTRIBUTION PATTERNS
(continued)

PLAN FOR UNITED GROCERS WAREHOUSE IN SACRAMENTO

Stress level is 2.533
12 additional tractors needed
19 additional trailers needed
41 additional drivers needed

Store sales factors:

Stanislaus	3.1	(1)
Lassen	3.2	
Tulare	4.8	(1) (2)

PLAN FOR VONS WAREHOUSE IN EL MONTE

Stress level is 1.781
30 additional drivers needed

Store sales factors:

San Diego	7.6
Riverside	7.6
San Bernardino	7.6
Santa Barbara	6.6

PLAN FOR RESTAURANT AND INSTITUTIONAL WAREHOUSES IN NORTHERN CALIFORNIA

Stress level is 1.133

Shipments to mass feeding centers (tons/wk)

Sacramento	26
Contra Costa	97
Alameda	450
Fresno	2606
Calaveras	220
Modoc	141
Placer	439
Mono	76
Madera	346
Colusa	127
Mariposa	142
Del Norte	129
Humboldt	1125
Nevada	391
Kings	1143
Amador	189
Lake	332
Yuba	255
Merced	934
Stanislaus	530
Alpine	5
Napa	204
San Mateo	13
Marin	16
Sierra	45
Sonoma	1240
Mendocino	852

PLAN FOR RESTAURANT AND INSTITUTIONAL WAREHOUSES IN SOUTHERN CALIFORNIA

Stress level is 3.318
369 additional tractors needed
594 additional trailers needed
1024 additional drivers needed

Shipments to mass feeding centers (tons/wk)

Santa Clara	247
Los Angeles	1674
Placer	389
San Benito	101
Monterey	485
Butte	1127
El Dorado	731
Plumas	239
Tehama	467
Shasta	1230
Santa Cruz	1021
Tuolumne	361
San Joaquin	921
Lassen	293
Solano	540
Ventura	735
Tulare	2629
Trinity	169
Glenn	290
Yolo	920
Siskiyou	462
Sutter	238

PLAN FOR OTHERS WAREHOUSES IN NORTHERN CALIFORNIA

Stress level is 1.058

PLAN FOR OTHERS WAREHOUSES IN SOUTHERN CALIFORNIA

Stress level is 2.238
19 additional tractors needed
29 additional trailers needed
228 additional drivers needed

(1) normally served at least partially by another warehouse
(2) served partially by another warehouse of the same company
(3) served partially by a warehouse of another company

APPENDIX 2, ATTACHMENT 2

SUMMARY OF REVISED WHOLESALE-RETAIL DISTRIBUTION PATTERNS

PLAN FOR ALPHA BETA WAREHOUSE IN LA HABRA

Stress level is 1.631
20 additional drivers needed

Store sales factors:

San Diego	8.0	
Riverside	8.0	
San Bernardino	8.0	
Ventura	8.0	
Tulare	6.7	(1) (2)

Shipments to mass feeding centers (tons/wk)

Orange	4600
San Diego	601

PLAN FOR ALPHA BETA WAREHOUSE IN MILPITAS

Stress level is 1.193

Store sales factors:

Santa Clara	5.2	
Alameda	4.0	
Fresno	7.2	
San Benito	5.2	
Santa Cruz	5.2	
Sonoma	3.3	
Solano	4.0	
Tulare	6.7	(2)

Shipments to mass feeding centers (tons/wk)

San Luis Obispo	2095

PLAN FOR CERTIFIED GROCERS WAREHOUSE IN LOS ANGELES

Stress level is 2.284
30 additional tractors needed
67 additional trailers needed
195 additional drivers needed

Store sales factors:

San Diego	8.0	
Alameda	4.0	
Fresno	7.2	
Kern	7.6	
Inyo	6.6	
Mono	6.6	
Riverside	8.0	
Imperial	8.0	
San Bernardino	8.0	
San Luis Obispo	6.7	
Santa Barbara	6.9	
Ventura	8.0	
Tulare	6.7	

Shipments to mass feeding centers (tons/wk)

Santa Barbara	506
Ventura	2577

PLAN FOR FLEMING WAREHOUSE IN FRESNO

Stress level is 1.208

Store sales factors:

Sacramento	2.6	
Santa Clara	4.8	
Contra Costa	5.1	
Alameda	3.7	
Merced	5.1	
Stanislaus	4.8	
Napa	3.7	
Marin	4.3	
Santa Cruz	4.8	
Sonoma	3.1	
San Joaquin	4.4	
Solano	3.7	

PLAN FOR LUCKY'S WAREHOUSE IN VACAVILLE

Stress level is 2.455
57 additional tractors needed
115 additional trailers needed
302 additional drivers needed

Store sales factors:

Santa Clara	5.2	
Alameda	4.0	
Madera	5.2	(2)
Stanislaus	4.3	
Monterey	5.2	
Marin	4.7	

United Grocers stores in:

Santa Clara	3.8	
Fresno	5.1	(3)
Modoc	3.2	
Kern	5.5	
Madera	3.7	
Mariposa	3.8	
Humboldt	2.5	
San Benito	3.7	
Lake	3.2	
Merced	4.8	
Monterey	3.8	
Tehama	2.8	
Shasta	2.9	
Marin	3.4	
San Luis Obispo	4.9	
Santa Cruz	3.7	
Sonoma	2.4	(3)

(1) normally served at least partially by another warehouse
(2) served partially by another warehouse of the same company
(3) served partially by a warehouse of another company

APPENDIX 2, ATTACHMENT 3

UNITED STATES DEPARTMENT OF AGRICULTURE
Agricultural Stabilization and Conservation Service
California USDA State Emergency Board
2810 Chiles Road, Suite A
Davis, California 95616

MEMBERSHIP ON USDA COUNTY EMERGENCY BOARDS
(California)

County Office Address & Telephone Numbers	Board Members	Agency
* ALAMEDA/CONTRA COSTA 5554 Clayton Rd, Rm. 4 Concord, CA. 94521 415-685-3645	Gerald Haet, Chairman Gordon Winlow, Member Paul W. Lambord, Member Robert Roan, Member Assistant County Supervisor, Stockton	ASCS AES AES SCS FmHA
BUTTE 2250-A Fifth Avenue Oroville, CA. 95965 916-534-0112	Darlys Cope, Chairman Alva Mitchell, Member County Supervisor, Oroville Royal Manion, Member Wayne Henderson, Member	ASCS AES FmHA FS SCS
COLUSA 655 Fremont Street Colusa, CA. 95932 916-458-5131	Lawrence E. Wold, Chairman Thomas Aldrich, Member Donald Greiner, Member Lynn Murray, Member	ASCS AES SCS FS
FRESNO 3001 Federal Building 1130 "O" Street Fresno, CA. 93721 209-485-5000, Ext. 496	Frank Zabaldano, Chairman Aaron Nelson, Member Morris A. Martin Jr., Member County Supervisor, Fresno Richard Nichols, Member	ASCS AES SCS FmHA FS
GLENN 259 North Villa P. O. Box 190 Willows, CA. 95988 916-934-4669	Garvey M. Cheek, Chairman Roy B. Jeter, Member Dennis E. Moore, Member County Supervisor, Willows George Mendel, Member	ASCS AES SCS FmHA FS
* HUMBOLDT/DEL NORTE 5630 South Broadway Eureka, CA. 95501 707-442-6058	Henry J. Hindley, Chairman John Lenz, Member Francis Morrell, Member County Supervisor, Eureka Rod Riley, Member	ASCS AES SCS FmHA FS
IMPERIAL 380 N. 8th St., Rm. 15 El Centro, CA. 92243 714-352-3531	Harold T. Greene, Chairman Adolph Van Maren, Member Forrest Flanagan, Member Arnold J. MacKenzie, Member County Supervisor, El Centro	ASCS AES SCS ARS FmHA

(APPENDIX 2, ATTACHMENT 3; Continued)

**	INYO/ALPINE/MONO P. O. Box 517 Minden, NV. 89423 702-463-2855	Jess Glouser Jr., Chairman P. Dean Smith, Member K. O. Strosnider, Member Don Roberts, Member Ralph Rawlinson, Member Assistant County Supervisor, Auburn	SCS AES ASCS FS FS FmHA
	KERN Federal Bldg., Rm. 219 800 Truxtun Avenue Bakersfield, CA. 93301 805-323-7676, Ext. 205	Richard Bressler, Chairman John Hoyt, Member Donald Louviere, Member County Supervisor, Bakersfield John Marker, Member	ASCS AES SCS FmHA FS
	KINGS 823 W. Lacey Blvd., Rm. 6 Hanford, CA. 93230 209-584-3373, 74 & 75	Robert L. Briney, Chairman G. V. Ferry, Member Ernest G. Eaton, Member County Supervisor, Hanford	ASCS AES SCS FmHA
*	LAKE/MENDOCINO 301 North Main Street P. O. Box 629 Ukiah, CA. 95482 707-462-3684	Ernest C. Pauli, Chairman William Brooks, Member Chester Hemstreet Jr., Member William Beatty Lee Belau, Member County Supervisor, Ukiah	ASCS AES AES SCS FS FmHA
*	LASSEN/PLUMAS/SIERRA 50 Hall Street Susanville, CA. 96130 916-257-4127	Marvin Dirksen, Chairman Carl Rimby, Member Arthur Scarlett, Member Roger Goff, Member James McLean, Member Assistant County Supervisor, Red Bluff	ASCS AES AES SCS FS FmHA
*	LOS ANGELES/SAN BERNARDINO 45116 North 13th West Lancaster, CA. 93534 805-942-9549	Louis Pryor, Chairman Donald Rosedale, Member George Rendell, Member Bobby Gaines, Member Dick Montique, Member Warren Noland, Member Richard Crawford, Member Assistant County Supervisor, Riverside	ASCS AES AES SCS FS AMS APHIS FmHA
	MADERA Rm. 4, P. O. Bldg. 201 South D Street P. O. Box 149 Madera, CA. 93637 209-674-4628	Edith J. Weaver, Chairman William Hambleton, Member Robert Palmer, Member Gary Morgan, Member	ASCS AES SCS FS

(APPENDIX 2, ATTACHMENT 3; Continued)

* MARIPOSA/MERCED 2839 G Street Merced, CA. 95340 209-722-4119	Roger W. Block, Chairman John Anderson, Member Glenn Voskuil, Member Odas Austin, Member Philo Winkle, Member County Supervisor, Merced	ASCS AES AES SCS FS FmHA
MODOC 1203 Oak Street P. O. Box 1291 Alturas, CA. 96101 916-233-4136	M. Wayne Peterson, Chairman Cecil Pierce, Member Richard Pyle, Member Lynn Horton, Member	ASCS AES SCS FS
* MONTEREY/SANTA CRUZ SAN MATEO Rm. 210, P. O. Bldg. 100 W. Alisal Street P. O. Box 567 Salinas, CA. 93901 408-424-7377	Albert Harner, Chairman J. W. Huffman, Member Eugene Ares, Member Dick Harrel, Member	ASCS AES SCS FS
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* PLACER/NEVADA/EL DORADO 915 Lincoln Way Auburn, CA. 95603 916-885-7911	Violet Messner, Chairman W. E. Mason, Member D. B. Leeson, Member Lynn A. Brittan, Member County Supervisor, Auburn David Nelson, Member	ASCS AES AES SCS FmHA FS
* RIVERSIDE/SAN DIEGO 81711 Highway 111 Indio, CA. 92201 714-347-3675	John Pavao, Chairman H. Fisk Phelps, Member Jack F. Smith, Member County Supervisor, Riverside Karl Tamelar, Member	ASCS AES SCS FmHA FS
* SACRAMENTO/AMADOR 8241 Fruitridge Road Suite 12 Sacramento, CA. 95820 916-452-4431	Torris J. Bickel, Chairman Ted Torngren, Member Robert Plaister, Member County Supervisor, Sacramento Gil Ward, Member William Hallsey	ASCS AES AES FmHA FS SCS

(APPENDIX 2, ATTACHMENT 3; Continued)

* SAN BENITO/SANTA CLARA 231 San Benito Street P. O. Box 500 Hollister, CA. 95023 408-637-4360	Kathleen J. Meehan, Chairman Edward Lydon, Member William Seyman, Member Lindell Perkins County Supervisor, Morgan Hill	ASCS AES AES SCS FmHA
* SAN JOAQUIN/CALAVERAS 807 N. San Joaquin Room 106 Stockton, CA. 95202 209-466-2671, Ext. 241	Lester Prater, Chairman Win Lawson, Member Dan Irving, Member Clifford Sorensen, Member County Supervisor, Stockton Kenneth Livingston, Member	ASCS AES AES SCS FmHA FS
SAN LUIS OBISPO 6750 El Camino Real Atascadero, CA. 93422 805-466-1551	Howard Stuedemann, Chairman John Evans, Member Clark Moore, Member Will Griffin, Member County Supervisor, Arroyo Grande	ASCS AES SCS FS FmHA
* SANTA BARBARA/VENTURA 142 E. Carrillo Street Santa Barbara, CA. 93101 805-963-3611	Ensley E. Wood, Chairman George Goodall, Member B. W. Lee, Member Donald Hansen, Member Art Carroll, Member	ASCS AES AES SCS FS
* SHASTA/TRINITY 3312 Bechelli Lane Redding, CA. 96001 916-241-7100, Ext. 323	Lynne Wenck, Chairman Walter Johnson, Member Bob Willoughby, Member Randall Reeves, Member Jack Godden, Member	ASCS AES AES SCS FS
SISKIYOU 180 Rose Lane Yreka, CA. 96097 916-842-3360	Rosalie Itano, Chairman Sedgley Nelson, Member Edward Anderson, Member County Supervisor, Yreka George McClusky, Member	ASCS AES SCS FmHA FS
* SONOMA/MARIN 2403 Professional Drive Suite 100 Santa Rosa, CA. 95401 707-544-1330, Ext. 401/2	Ruthe Gridley, Chairman Robert Sisson, Member Don Brittsan, Member Charles Swisher, Member County Supervisor, Santa Rosa	ASCS AES AES SCS FmHA
* STANISLAUS/TUOLUMNE 1701 Coffee Road Suite 2 Modesto, CA. 95353 209-523-3273	H. J. Biedenweg, Chairman Armen Sarquis, Member R. D. Roberts, Member Eldon Glenn, Member County Supervisor, Modesto	ASCS AES AES SCS FmHA

(APPENDIX 2, ATTACHMENT 3; Continued)

*	SUTTER/YUBA 224 Carriage Square Yuba City, CA. 95991 916-673-4347	James Caldwell, Chairman Leonard Buschmann, Member Ernest Paschke County Supervisor, Yuba City	ASCS AES SCS FmHA
	TEHAMA 940 Walnut Street P. O. Box 190 Red Bluff, CA. 96080 916-527-3013	Russell Christensen, Chairman Ronald Knight, Member Warren Brown, Member County Supervisor, Red Bluff Jan Seils, Member	ASCS AES SCS FmHA FS
	TULARE 3346 W. Mineral King Ave. Visalia, CA. 93277 209-734-5814	Eugene Bennett, Chairman Curtis Lynn, Member Billy Bruner, Member County Supervisor, Visalia Jim Hickman, Member	ASCS AES SCS FmHA FS
	YOLO 117 West Main Street Woodland, CA. 95695 916-662-3986	Chester Parker, Chairman Carl Schoner, Member Kenneth Bigelow, Member	ASCS AES SCS

* Indicates two or more counties served by a single board.
** Served by Nevada State Emergency Board.

APPENDIX 2, ATTACHMENT 4

SUGGESTED SHIPPING GUIDELINES FOR WHOLESALERS SUPPLYING HOST AREA RETAIL OUTLETS

CATEGORY	SHIP	RETAIN
Meat	All items	
Produce	All items	
Dairy products	All items	
Frozen foods	All items, as host area storage space permits	
Bakery goods	All items	
Dry groceries	Baby Foods; Baking Mixes; Baking Needs; Candy; Cereals; Cocoa; Condiments; Cookies; Crackers & Bread Products; Desserts; Diet Foods; Fish (Canned & Dried); Flour; Fruit (Canned & Dried); Household Cleaning Compounds; Jams, Jellies & Spreads; Juices & Juice Drinks; Laundry Supplies; Macaroni Products; Meat Products; Milk (Canned & Dried); Paper Products; Pet Foods; Prepared Foods; Salad Dressings; Salt, Seasonings; Shortenings & Oils; Soaps, Detergents & Disinfectants; Soup; Sugar; Syrups & Molasses; Vegetables (Canned & Dried).	Beer, Wine & Ale; Cigarettes; Coffee; Gum; Household Supplies (Furniture Polish, Shoe Polish, Air Fresheners, Floor Wax); Snacks; Soft Drinks; Tea. (Note: If vehicle availability is not critical, certain of the above items (i.e., coffee, tea, soft drinks) may be shipped as morale boosters.)
General Merchandise	Batteries; Flashlights; Light Bulbs; Anti-Freeze; Motor Oil; Twine; Sponges; Brushes; Candles; Charcoal & Charcoal Lighters; Outdoor Equipment.	Stationery & School Supplies; Lighter Fluid; Turpentine, Housewares; Lighting Accessories; Sunglasses; Toys; Grass Seed; Pet Supplies; Soft Goods (Hosiery, Gloves, Etc.).
Health & Beauty Aids	Aspirin; Baby Needs; First Aid Items; Oral Hygiene Products; Proprietary Remedies.	Cosmetics; Deodorants; Hair Care Needs; Shaving Needs; Skin Care Aids.

REVISIONS OF PLANNING GUIDELINES

Original prepared September 1975
Updated August 1978
Revised July 1979
Revised July 1980

GUIDELINES REVISIONS

The results of the California research have been reviewed in light of the current guidance for crisis relocation planning. As a result of this review, it appears that the basic strategy proposed for food distribution under crisis relocation conditions is sound and suitable for use in highly-urbanized areas that have problems similar to those found in California. However, analysis of the food distribution system in California has brought to light several elements which should be included in the crisis relocation guidance for areas with similar characteristics. These elements include:

1. Planning for limited intercompany transfers to reduce transportation stress and balance host-area shipments;
2. Assignment of secondary warehouse space in the host areas to each major risk-area distributor, to be used as necessary to augment risk-area wholesale operations;
3. Guidelines for limited use of drop-shipments directly from processors to host-area retailers, under the central control of major distributors; and
4. Provision for rail shipments of canned goods and other dry groceries from processors' risk-area warehouses to host-area warehouses, secondary distribution centers, intermodal transfer points, or rail sidings.

Guidelines for state and local planners have been updated to reflect these elements, as well as other factors identified in extensive interviews with planners and industry personnel. The following sections of the Guidelines have been revised:

I. Introduction

The revised introduction to the Guidelines, while retaining much of the material from the original introduction, outlines the results of the research described in Volume I of this report. This research indicated a need for certain revisions to the Guidelines to aid those preparing plans for areas that have problems similar to those encountered in California. The primary subjects of revisions were in Warehousing and Transportation.

II.C.1 Warehousing

Changes in warehousing guidelines included provision for transfers between different retail chains to better balance emergency food distribution to the host areas and reduce transportation stress. This provision affects both warehousing and transportation and should be discussed with each major retail chain representative during the interview process. Provision for locating and supplying host-area warehouses was also included in the revisions to the warehousing section.

II.C.2 Transportation

The transportation section has been revised to include the effects of transfer between different wholesale chains, the effects of various alternatives evaluated for transportation in California, and the effects of shipment of canned goods and other dry groceries from processors' risk-area warehouses to host-area distribution points.

III. Bibliography

An amendment to the Bibliography has been prepared and provides an updating of publications according to subject as they appear in the Guidelines. In addition, a number of new publications have been listed, also by Guidelines subject.

I. INTRODUCTION

An earlier investigation of food distribution under crisis relocation conditions[1] led to the preparation of guidelines for planners and officials charged with the responsibility of developing relocation plans at the regional, state, and local levels. These guidelines were subsequently updated to include the results of research on the effects of attack on food distribution to the relocation population[2]. The revisions updating the guidelines to reflect postattack research included the following factors:

- Postattack guidance for food decontamination and distribution;
- Provisions for identifying critical stockpiles of food held outside normal distribution channels in risk areas, and moving these stockpiles to host areas;
- Guidelines for expanding the capacity of existing food processing plants;
- Provision for allowing smaller risk area food processors and wholesalers to continue operations throughout the crisis period if they so desire;
- Clarification of the liaison role to be played by the U. S. Department of Agriculture under crisis relocation conditions;
- Guidelines for anticipating postattack shortages of specific commodities and adjusting priorities for shipments during the crisis relocation period accordingly.

In this volume, past guidelines have been updated to reflect these factors as well as other concerns identified in extensive interviews with planners and industry personnel.

---

[1] Billheimer, John W., Frank J. Jones and Myron Myers, "Food System Support of the Relocation Strategy," SYSTAN, Inc. Report on DCPA Work Unit 2312F, Los Altos, California, September 1975.

[2] Billheimer, John W. et al., "Effects of Attack on Food Distribution to the Relocated Population," prepared for DCPA Contract DCPA01-76-C-0512, Work Unit 2312F, SYSTAN, Inc., September 1978.

The original guidelines were developed to aid all NCP planners and local officials in organizing and implementing food distribution under crisis conditions in their jurisdictions. The present revisions to the guidelines are based primarily on investigations in California, but are intended to assist those involved in developing food distribution plans in other highly urbanized areas that have similar problems. The results of this research, described in Food System Support of the Relocation Strategy in California, indicate the need for several additions to the guidelines, including:

1. Planning for limited intercompany transfers to reduce transportation stress and balance host-area shipments;

2. Assignment of secondary warehouse space in the host areas to each major risk-area distributor, to be used as necessary to augment risk-area wholesale operations;

3. Guidelines for limited use of drop-shipments directly from processors to host-area retailers, under the central control of major distributors; and

4. Provisions for rail shipments of canned goods and other dry groceries from processors' risk-area warehouses to host-area warehouses, secondary distribution centers, intermodal transfer points, or rail sidings.

A. Summary of General Food Distribution Procedures

Figure I-1 summarizes the general guidelines for food distribution under crisis relocation conditions that have evolved from past research efforts. These guidelines identify activities at the state and regional level as well as activities in the risk area being evacuated and the host area receiving evacuees. The regional nature of the nation's food distribution system makes it imperative that plans for redirecting this system in times of emergency be prepared at the state or regional level. Planning efforts undertaken at this level should include the redirection of normal supply channels to the host areas and the reallocation of transportation drivers and equipment needed to support this redirection. State officials should also rescind all state regulatory restrictions (e.g., highway weight limitations) which might inhibit the redirection of supplies under emergency conditions.

Figure I-1 also summarizes the suggested activities to be undertaken by risk area and host area food producers, processors, wholesalers, retailers, preparers, servers and consumers during a crisis relocation. For all elements of the food distribution at the wholesale level and above, these activities have been designed to parallel normal distribution activities as closely as possible. A conceptual view of the flow of food under crisis relocation conditions appears in Figure I-2. Extensive research and discussions with food industry personnel have led to the conclusion that the most effective strategy for food distributuion under crisis relocation conditions is to allow agricultural production and the output of major processing plants to follow normal channels and to continue using risk area wholesale facilities to serve the evacuated population. These wholesale facilities would provide a highly increased level of service to those retail stores located in outlying host areas.

The proposed distribution adjustments outlined in the guidelines of Figure I-1 and depicted conceptually in Figure I-2 have many attractive features: The altered system is conceptually simple, and builds intelligently on the existing system without creating new operating entities. Corporate chains are preserved as distribution units, and most host area retail stores will continue to be supplied by their pre-evacuation sources. Strain on the national distribution system is minimized and supplies on the road from national processors to regional and local wholesalers at the time of evacuation need not be rerouted.

Although the proposed adjustments would not substantially change the national channels of distribution supplying the risk and host areas, the local distribution system would be drastically altered. Certain points of stress in the adjusted local distribution system are immediately apparent. In addition to placing a heavy load on retail stores in the outlying host areas, the adjusted system greatly increases local transportation requirements. The distance traveled by local delivery trucks will be substantially increased by massive population movements. In order to ensure that the increased transportation requirements imposed by a crisis relocation can be met, and that the revamped distribution system will function efficiently following the evacuation of risk areas, careful advance planning is required.

B. Three Planning Questions

A necessary component of any plan for food distribution under crisis relocation conditions is a compilation of detailed information regarding the food sources normally supplying the affected area, typical transportation modes, and the location and magnitude of food supplies in the distribution pipeline from producer to consumer.

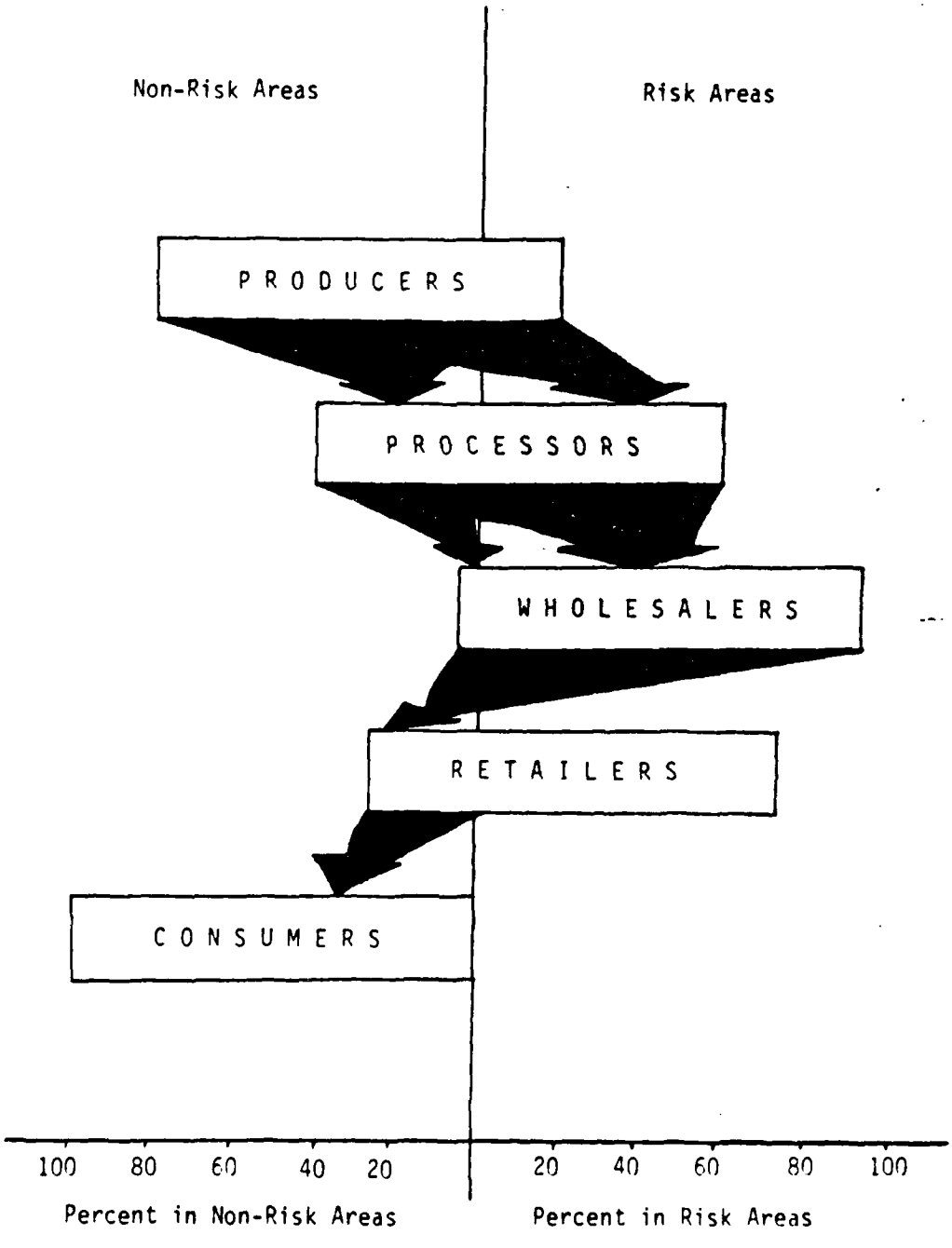
FIGURE I-1: RECOMMENDED GENERAL GUIDELINES FOR PROVIDING FOOD SUPPORT FOR THE CRISIS RELOCATION STRATEGY

STATE AND REGIONAL ACTIVITIES	
• Define distribution patterns for chain and independent wholesalers. • Arrange for any additional drivers and equipment made necessary by revised distribution patterns through NDTA. • Waive vehicle highway weight restrictions • Publicize waiving of HOT Driver Restrictions	
	RISK AREA ACTIVITIES
PRODUCERS	• Continue any agricultural activity of national, regional, or local significance. (Little significant agricultural production currently [illegible] risk areas.)
PROCESSORS	• Continue only those processing activities that lead to production of commodities included in emergency standards and that either are national or regional in scope or command a significant share of the local market. • Encourage workers in discontinued processing activities to transfer their skills to similar host area processing facilities • Ship excess inventory of canned goods and other dry groceries, as ordered, to host area storage points.
WHOLESALERS	• Continue to operate all chain and independent wholesale operations that command a significant (i.e., over 10%) share of the local market, following revised distribution patterns specified at state and regional level • Empty smaller warehouses as quickly as possible, transferring goods to host area commissaries and warehouses. Encourage workers in discontinued operations to seek employment in host area warehouses. • Augment transportation fleet and driver pool as required, following guidelines and procedures established by NDTA for obtaining personnel and equipment from other sectors. • Increase vehicle and driver productivity by taking advantage of waived driver restrictions and weight limitations, minimizing down-time; relaxing maintenance requirements, increasing vehicle loads, loading only full pallet quantities; [illegible]
RETAILERS	• Observe price controls & single purchase limitations established nationally during pre-crisis period and evacuation period. • As inventories & personnel permit, remain open during evacuation period. Then close operations for duration of crisis relocation period & report on remaining inventories. • Chain stores arrange for employees to transfer to chain's host area outlets for duration of emergency. Employees of independent stores should be encouraged to seek employment in host area retail outlets
PREPARERS AND SERVERS	• Chain restaurants with host area outlets should transport inventories to these outlets & reassign workers to host area operations • Fast food operations should prepare as many meals as possible during evacuation period & make them available at evacuation staging area • Caterers should relocate all mobile food preparation equipment & as much of their inventories as possible to host area. • Institutions & stores with equipment for large-scale food preparation should transport inventories & equipment to host area
CONSUMERS	• Avoid hoarding in pre-crisis period • Transport as much non-perishable food to host area as is permitted by home stocks and mode of transportation. A one- to two-week supply [illegible]
CONTROLS	• Price regulation & liberal single-purchase limitations at retail outlets during pre-crisis and evacuation periods.

	HOST AREA ACTIVITIES
PRODUCERS	• Continue all agricultural activity.
PROCESSORS	• Continue all food processing activity, expanding operations where possible through the use of relocated workers and unused capacity.
WHOLESALERS	• Continue all food warehousing and distribution activities, expanding operations where possible through the use of commandeered space, worker overtime, and relocatees workers. Transfers between different companies may be worked out as necessary. • Augment transportation fleet and driver pool as required, following guidelines and procedures established by NDTA for obtaining personnel and new equipment from other sectors. • Increase vehicle and driver productivity by taking advantage of waived driver restrictions and weight limitations, minimizing down time, relaxing maintenance requirements, increasing vehicle loads, loading only full pallet quantities; and shipping only necessary commodities
RETAILERS	• Observe price controls, single purchase limitations, rationing plans, & coupon redemption policies established nationally during pre-crisis period & for duration of crisis relocation period • Continue all retail food operations, expanding as required by using added personnel relocated from risk area; extending business hours, authorizing overtime work, stocking at night, and identifying and using expedient nearby storage space.
PREPARERS AND SERVERS	• Restaurants & kitchen-equipped institutions should expand operations by using additional personnel relocated from risk area, enlarging seating capacity, & identifying & using expedient nearby storage space (garages, etc. • Large scale mass feeding operations in kitchen-equipped institutions will be supervised by disaster agencies such as Red Cross • Distribute food preparation equipment & incoming inventories as needed among institutions, restaurants, congregate care facilities, & private residences with hosting [illegible]
CONSUMERS	• Avoid hoarding in pre-crisis period. • Encourage host area residents to provide shelter and food to members of relocated population
CONTROLS	• Price regulation & conservative single-purchase limitations at retail outlets during pre-crisis period. • Price regulation & coupon rationing at retail outlets, restaurants, & mass feeding facilities during crisis evacuation

FIGURE I-2

FOOD DISTRIBUTION UNDER CRISIS RELOCATION STRATEGY



The required information may be characterized as the answers to three questions:

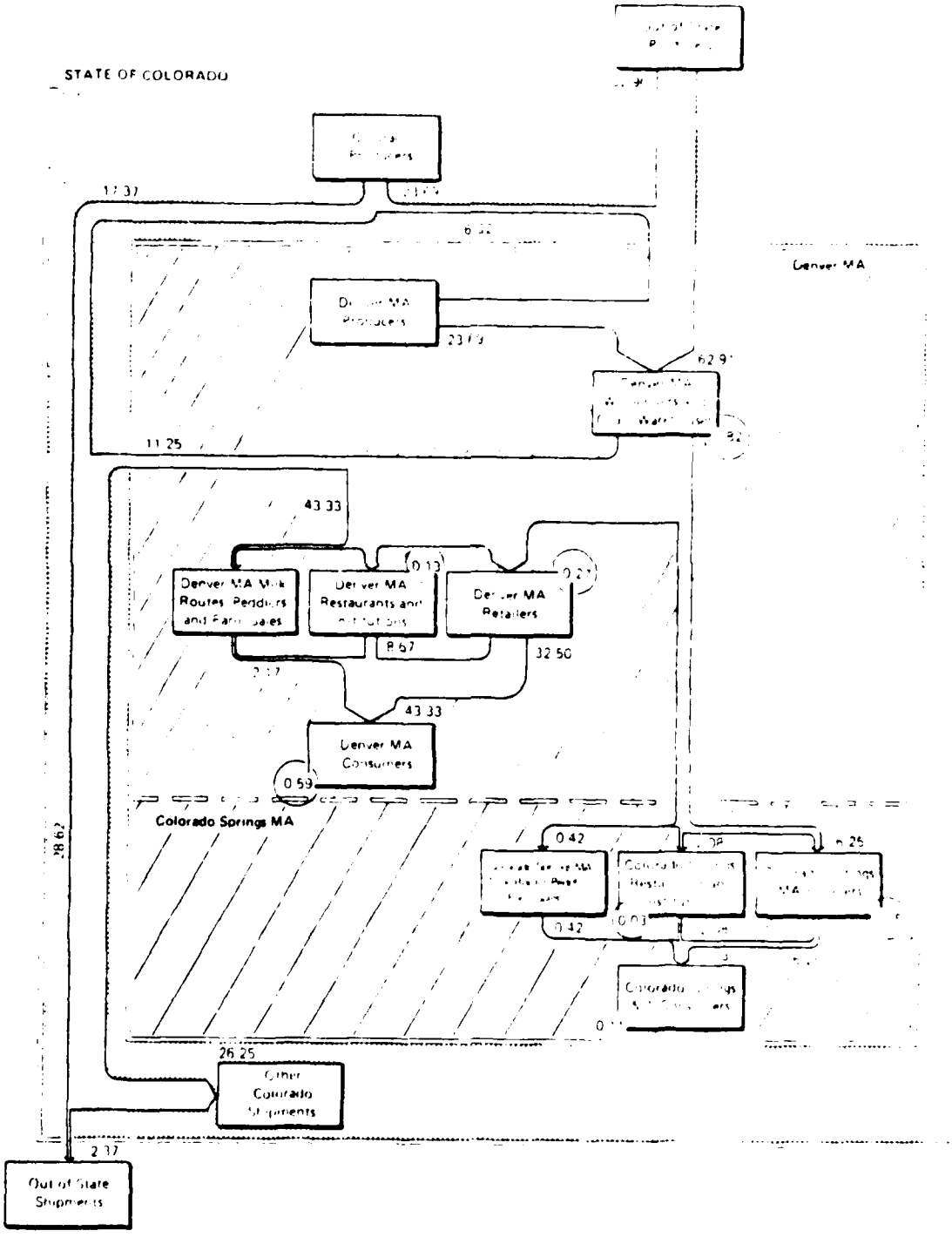
1. Where does the food come from?
2. How does it come?
3. Who has the food now?

Graphic illustrations of potential answers to questions (1) and (3) appear in Figures I-3 and I-4. Figure I-3 details the flow of shell eggs into Denver and Colorado Springs, while Figure I-4 identifies the grocery chains responsible for food distribution in the risk and host areas of Colorado Springs, Colorado. Questions involving food sources and national transportation capability are particularly important in postattack planning. Given the relatively short projected duration of a crisis relocation posture, questions regarding the immediate locations and identity of local food distributors are particularly important in crisis relocation planning. A comprehensive planning effort, however, must address all three of the above questions.

C. Two Planning Approaches

There are at least two diverse strategies for answering the three planning questions posed above and identifying patterns of food movement in a community. These two strategies can be characterized as the "top down" and "bottom up" approaches. Planners using the "top down" approach rely heavily on published statistics (census data, USDA statistics, trade profiles, etc.) to provide a picture of commodity movement patterns. Those using the "bottom up" approach attempt to identify patterns of commodity movement by undertaking extensive interviews with those food industry personnel actually responsible for that movement in a community. These two

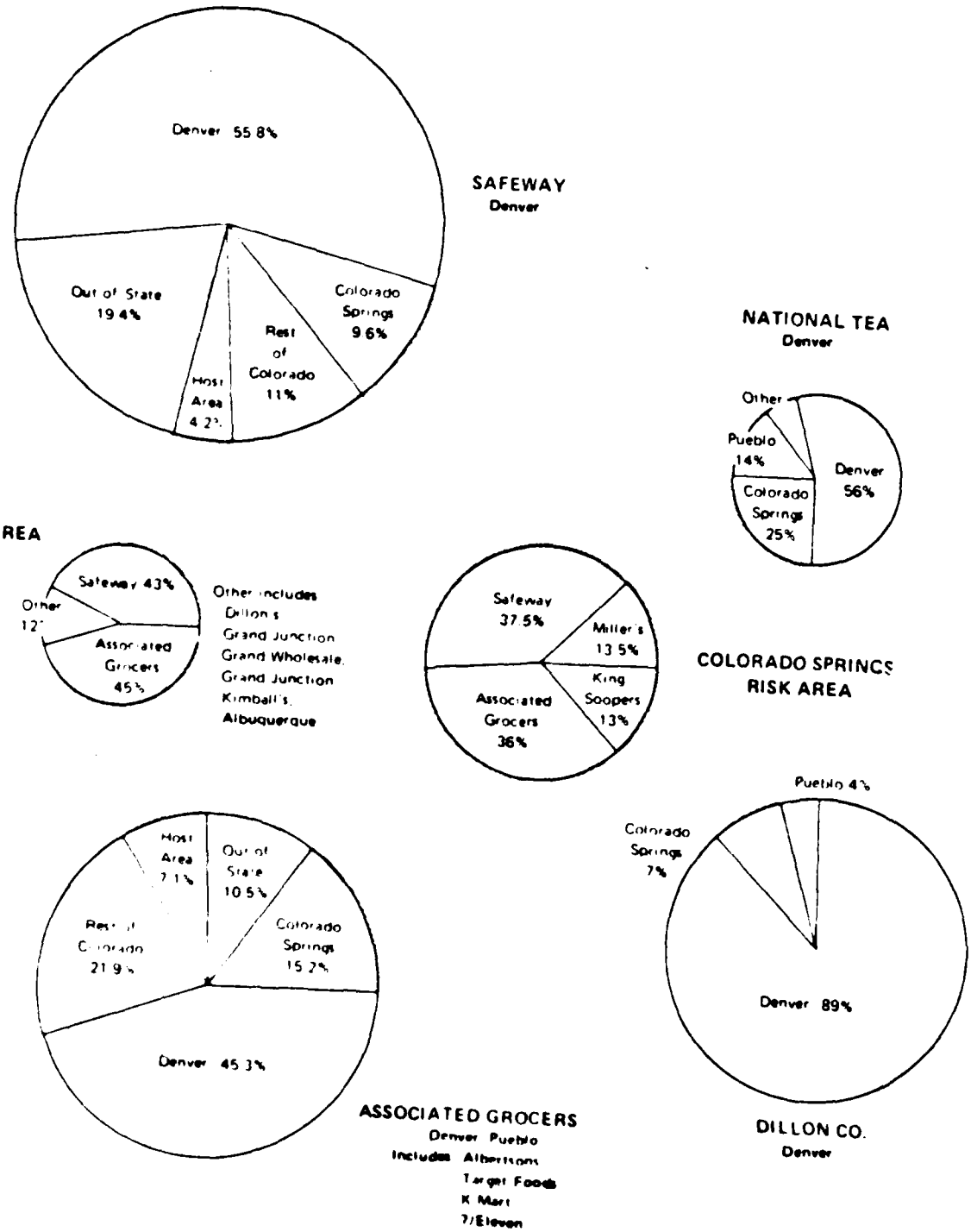
DISTRIBUTION OF SHELL EGGS IN THE DENVER AND COLORADO SPRINGS METROPOLITAN AREAS



Figures outside rectangles represent throughput in millions of pounds annually
Figures inside circles represent inventory in millions of pounds.

FIGURE I-4

SOURCES OF SUPPLY, COLORADO SPRINGS RISK AND HOST AREAS



(Source: Reference 2)

approaches are not mutually exclusive, and both should be applied in order to obtain a comprehensive picture of a community's food movement. In developing a crisis relocation plan, however, the importance of local food industry personnel to the successful reallocation of supplies under crisis relocation conditions makes it imperative that the "bottom up" approach be used extensively. One of the most important features of a community's crisis relocation plan is the identification of those local industry leaders who control existing food supply channels and who have a preliminary understanding of the ways in which those channels must be diverted to meet crisis relocation requirements. The identification and briefing of these industry leaders will be at least as important to the successful implementation of a crisis relocation plan as the identification of inventory locations and sizes.

E. Organization of the Guidelines

Planning guidelines presented in Section II of this report are orgainzed under the following headings:

A. Production

B. Processing

C. Distribution

   1. Warehousing

   2. Transportation

   3. Retailing

   4. Restaurants and Institutions

D. Preparation and Serving

   1. Equipment

   2. Manpower

   3. Menus

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   2. Manpower

   3. Menus

E. Consumption

F. Postattack Considerations

Within these headings, four general topics are addressed in Section II:

- Published data sources for the "top down" approach
- Information sources and data for the "bottom up" approach
- Planning guidelines, including
  - (i) Rules of Thumb and Distilled Conventional Wisdom
  - (ii) Promising Analytical Approaches
  - (iii) Summaries of Required Information

Detailed tabular data supporting the planning guidelines and providing additional planning information have been included in five appendices corresponding to Categories A through E. Three additional appendices have been added dealing with the following topics:

Appendix F: Simplified Calculation of Distribution Stress Factors

Appendix G: USDA Crisis Relocation Guidance

Appendix H: USDA National Emergency Food Distribution Allowance

The Planning Bibliography* presented in Section III of this report is also organized in the above categories A through E. The Bibliography also contains two additional headings:

F. Emergency Distribution Studies and Guides

G. Overview of the Food Distribution System

H. Postattack Considerations

*References throughout Part Three are listed in terms of their position in the Section III Bibliography. Thus, the reference C1-1 refers to the first bibliographical reference under the category C1 -- Distribution Warehousing.

F. Changes Based on Evaluation of Food Distribution in California Under Crisis Relocation Conditions

Most of the material in the revised guidelines (Effect of Attack on Food Distribution to the Relocated Population) remains unchanged by the analysis of food distribution to the relocated California population. The primary changes in the guidelines have been made in Section II.C, Distribution. The specific subsections changed are C.1 (Warehousing) and C.2 (Transportation) as noted below.

C.1 Warehousing

° Provide guidance for identification and assignment of secondary warehouse space in the host areas to each major risk-area distributor, to be used as necessary to augment risk-area wholesale operations.

° Guidelines for limited use of drop-shipments directly from processors to host-area retailers, under the central control of major distributors.

C.2 Transportation

° Provide guidance for planning limited intercompany transfers to reduce transportation stress and balance host-area shipments.

° Guidelines for rail shipment of canned goods and other dry groceries from processors' risk-area warehouses to host-area warehouses, secondary distribution centers, intermodal transfer points, or rail sidings.

An amendment updating and expanding the Bibliography (Section III) has also been provided.

C.1 WAREHOUSING REVISIONS

WAREHOUSING REVISIONS

C.1 Warehousing

The general term "warehousing" encompasses the activities carried on by independent food wholesalers, brokers, and the distribution centers of major grocery chains. These activities are the first in the distribution chain to be significantly altered by a crisis relocation strategy.

C.1-1 The "Top-Down" Approach

Relatively few up-to-date information sources exist to support a "top-down" approach to the study of the food warehousing function. The Census of Business (C.1-11) and County Business Patterns (C.1-12) summarize total wholesale food sales by county, but these figures do not reflect the activity of the most important participant in the food distribution process, the major grocery chain.

The principal source of data on food inventories held at wholesale is a now-dated study performed by the USDA in 1963 (C.1-6, C.1-8). Data developed in this study were included in a broader study in which comprehensive county-by-county estimates of food stocks were made at all positions of the distribution system. These estimates, which were based on sampling procedures and assume a gross consumption level of 2,000 calories per day, appear in the 1964 USDA Agricultural Economic Report Number 57, "Food Supplies Available by Counties in Case of a National Emergency" (C-9).

Although certain of the estimates appearing in Agricultural Economic Report Number 57 may have remained valid over time*, the estimates of wholesale food stocks on hand are particularly difficult to accept currently. The substantial increases in interest costs since 1963 have caused food distributors to cut their wholesale inventory levels to conserve investment capital. Moreover, the sampling procedure used to allocate wholesale stocks on a

*The USDA is currently undertaking a research effort to update much of the basic information appearing in this study.

county-by-county basis were somewhat questionable even in 1963. The report admits that the figures for wholesale stocks in any given county are synthetic, since they were based on a nationwide sample of 5,000 wholesale establishments of different types. This sample was extended to the county level on the basis of local population data. Whereas population statistics provide a suitable surrogate for allocating retail stocks, they tend to be poor indicators of food wholesaling activity. The inadequacy of this approach has been noted in several past studies of emergency food availability* (F-5, F-34).

Although the estimate of wholesale food stocks included in Agricultural Economic Report 57 are suspect at the county level, certain of the nationwide summaries assembled in preparing this report provide useful indicators of wholesale food distribution activity. A supplemental report issued by the USDA at the same time (C.1-8) estimates the relative level and mix of commodities held in wholesale warehouses throughout the United States.

Although no recent data have been published showing the amount of dry groceries held in food distribution warehouses, the USDA statistical reporting services publishes monthly reports of the total amount of stocks held in cold storage throughout the country (C.1-9). Data for these reports are collected from refrigerated storage centers, public or private, where food products are normally stored for thirty days or more.

C.1-2 · The "Bottom-Up" Approach

The "bottom-up" approach can prove particularly fruitful in identifying the sources, location, and relative importance of the major food distribution centers serving a specific area, since the number of such centers is generally sufficiently small so that 90% of a city's food supply may be pinpointed with a limited number of personal interviews. Attempts to apply this approach

---

*In the Colorado Springs case study described in Part One of this report, the USDA estimate in Agricultural Economic Report Number 57 ascribes enough wholesale food stocks to Fremont County to last local citizens 11 days. Most of the wholesale food destined for Fremont County is stored in Denver, however, and the county itself houses only two small institutional food wholesalers with far lower inventories than are implied by an 11-day supply.

should begin with the Supermarket News Study of Grocery Stores Sales (C.3-5). This study annually publishes a breakdown of the retail grocery outlets serving 289 cities throughout the country. This breakdown contains statistics showing the number of stores, market share, and principal supplier of each chain and group of independent retailers. Once the major suppliers in a study area have been identified through the use of this reference, trade directories such as the Chain Store Guide (C.1-2) and Thomas Wholesale Register (C.1-13) may be used to determine the market territory covered by individual distribution centers and identify individual representatives to be contacted for personal interviews. The most reliable source of data on the number and location of stores is the individual food chain itself.

Interviews with wholesalers are quite useful in that they provide first-hand insights into retail operations and distribution patterns which tend to vary considerably from one geographic area to another. Interviews are particularly helpful in those areas where special distribution patterns may exist. In California, for example, wholesalers' trucks in many cases travel long distances to serve the requirements of their stores. Information can also be obtained in interviews regarding the possibility of intercompany transfers and the limited use of drop-shipments should these measures be advisable. Drop-shipments may be advisable on a limited basis and can be particularly appropriate where the processor is located in the host area. Drop-shipments are used more extensively for smaller association members and can be expanded to those host areas. Centralized control can be maintained by handling store orders through a regular association or chain centralized system. Also, a guide to the market coverage of each food chain in the United States showing the number and location of stores served by each of the distribution warehouses operated by the chain is published annually by Media General (C.1-1).

The county food facility listings maintained by the USDA ASCS show the location and size of major wholesale food warehouses in each county in the United States. In addition, the USDA Food Distribution Research Laboratory has undertaken exhaustive studies of the independent wholesale food distribution facilities in over 65 major United States cities. (These cities are mapped in Appendix C.) The USDA studies typically trace food flow, identify

relevant distribution costs, and suggest means for improving a city's wholesale distribution facilities. USDA studies of distribution facilities in Denver (C.1-5), Detroit (C.1-7) and Los Angeles have provided useful information for current and past investigations of the crisis relocation strategy.

C.1-3 Planning Guidelines

C.1-3.1 Required Information.

° Wholesalers. The following information should be sought from each major wholesale food distributor serving a community:

Designated CRP Representative
- Name and Title
- Home and Business Phone

Inventory Levels
- Days at Wholesale
- Days at Retail (Chains Only)

Warehouse Information
- Size (Square Feet)
- Number of Loading Docks
- Estimated Time to Empty with Present Equipment and Personnel

Transportation Equipment
- Number of Tractors
- Number of Trailers and Capacities
- Miles per Gallon (Loaded)
- Vehicle Range (Miles per Tank of Gas)
- Vehicle Down Time (Hours per Day)
- Average Loading Time (Hours per Truck)

Personnel
- Number of Warehouse Personnel
- Number of Drivers
- Required Emergency Personnel

Marketing Information
- Annual Throughput (Million Pounds per Year or Dollar Volume)
- Number of Stores Served
- Location of Stores Served

Sources of Supply

In-Transit Inventory (Days)

Incoming Transportation Modes (% Truck, Rail, etc.)

In addition to the quantitative information specified above, accounts of past operating experiences under conditions of stress (strikes, disaster relief, etc.) should be sought to provide insights into potential emergency operating procedures.

The gross volume of food products handled through wholesale warehouses will depend partly on the ability to load and unload trucks. This in turn will depend on the availability of materials-handling equipment and transportation to spot trailers and railcars. Assuming adequate transportation equipment, the following loading and unloading rates can be used at existing truck and rail docks:

Manual	10,000 pounds per hour;
Hand Truck	20,000 pounds per hour; and
Forklift	40,000 pounds per hour.

° Commandeered and Converted Host-Area Space.

An analysis of the implications of postattack strategy on crisis relocation planning indicates that additional host-area warehouse or "storage" space will be needed during the relocation period and after an attack. Some data on host-area warehouses presently being used for food distribution or storage are provided in the ASCS Food Facility Listings. Information on other host-area warehouses or buildings suitable for food distribution and storage usage can be obtained from warehousing firms, a county plants location directory, county assessors' offices, or real estate leading agents. Also, information can be obtained from food processors, a number of which have major warehousing facilities in host areas or on the fringes of risk areas. The list should include such information about each structure as:

1. Location;
2. Area (square feet by floor);
3. Loading Dock Data;
4. Inside Ceiling Clearance;
5. Temperature Control; and
6. Type of Material Used in Construction.

C.1-3.2 USDA Donated Commodities Warehousing.

Although by far the largest volume of food distribution is carried out by the chains and independent wholesalers, there has recently been an increase in federal and state government food distribution operations. In recent years, the availability of USDA-donated foods from state and private warehouses has been on the decline due to the switch from donated foods to food stamps for needy people. This trend has been reversed in the very recent past, to the extent that the USDA Food Nutrition Service is now purchasing more food commodities for school feeding programs than in previous years. USDA Food and Nutrition Service Food Distribution Division allocates the donated food product and distributes it to the various stages; the food is then distributed to the schools for the School Lunch Program and to institutions. It appears that this type of assistance will continue to expand. A list of the total U.S. School Lunch Program food is shown in Appendix Table C-14. A listing of Food and Nutrition Service regional offices is provided in Appendix Table C-15.

Within each state, an organization (which could be part of the state's Department of Education) has been set up to handle USDA-donated commodities. This usually includes an office, a state warehouse for dry grocery storage, and possibly a private warehouse for cold storage. These state distribution offices can be helpful in supplying statistical data and other information on the various USDA-donated commodity programs under its auspices. The following information regarding donated commodities should be obtained or developed and included in the food annex:

- Location of each state and private warehouse;
- Average level of inventory at each warehouse (to be moved from the risk area);

° Authorized state or local personnel who must be contacted; and

° Transportation plan.

C.1-3.3 General Operating Guidelines.

In past studies of wholesale warehouse operations, inventory levels ranging between 1-1/2 and 4 weeks of normal supplies have been encountered. The lower end of this range reflects the performance of a chain store operation serving a limited geographic area, while the upper limit of four weeks is more characteristic of an independent wholesaler serving many clients scattered over a wide area. Stocks of dry groceries (including canned goods) are greatest, followed by frozen foods and dairy products. Few wholesale grocers maintain more than a four-day supply of meats and perishable goods.

Tables II-1 and II-2 present a compendium of operating statistics and conversion factors for a typical wholesale food distribution center. Appendix C contains guidelines developed in Part One of this report identifying items to be shipped from wholesale warehouses under crisis relocation conditions.

TABLE II-1

OPERATING STATISTICS FOR A TYPICAL WHOLESALE FOOD DISTRIBUTION CENTER

	Non-Foods	Dry Groceries	Meats	Produce	Frozen Foods	Bread	Milk	IceCream
Percent of Shipments by Weight	5.3	38.3	8.5	22.3	4.8	3.2	15.9	1.7
Percent of Shipments by Cubic Volume	6.2	29.6	8.7	21.0	4.0	14.8	13.0	2.7
Percent of Shipments by Retail Sales Volume	3.7	40.4	28.6	7.6	3.4	5.0	10.2	1.1
1000 #/Load	26.0	39.0	29.5	32.0	33.0	6.5	37.0	20.0
Effective Density #/Cubic Ft.	18.'	27.'	20.5	22.2	22.9	4.5	25.7	13.9

TABLE II-2

CONVERSION FACTORS FOR A TYPICAL WHOLESALE FOOD DISTRIBUTION CENTER

MARCH, 1975

	Dry Groceries	Meat	Frozen Foods	Produce
# Per Case	26	31	16	31
$ Per # at Wholesale	$0.33	$0.63	$1.13	$0.14

C.2 TRANSPORTATION REVISIONS

C.2 Transportation

Transportation questions addressed in this report are limited to those directly involved with the movement of food, particularly with the movement from risk-area distribution centers to host-area outlets. A more comprehensive view of the relationship of transportation and CRP planning is addressed in other SYSTAN studies (Amended Bibliography F.2).

C.2-1 The "Top-Down" Approach

Few statistics exist below the nationwide level to support a "top-down" investigation of food transportation under crisis relocation conditions. The Census of Transportation reports nationwide estimates of commodity ton-miles moved by mode (C.2-2), and the ICC maintains a one percent waybill sample of commodity movement. The USDA regularly estimates the contribution of transportation to the nation's food marketing bill and published various nationwide statistics on transportation of farm products (G-12, C-8). Estimates of the number of heavy trucks operating in a county may be obtained from the vehicle registration statistics kept by the state department of motor vehicles or the county clerk's office.

C.2-2 The "Bottom-Up" Approach

At the local level, most food transportation is accomplished by private truck fleets owned and operated by grocery chains and independent wholesalers. Information regarding these fleets may be obtained in the course of personal interviews with distribution center managers (see C.1-2, which describes the "bottom-up" approach to the warehousing function). Many USDA studies of food distribution facilities in various cities (see, for example C.1-5 and C.1-7) discuss local food transportation problems in detail.

Estimates of the number and ownership of additional vehicles and drivers that might be pressed into moving food under crisis relocation conditions may usually be obtained by contacting the local representatives of the National Defense Transportation Association (NDTA).

C.2-3 Planning Guidelines

C.2-3.1 Required Information.

As noted in Section C.1-3.1, the following information should be sought from each manager of a transportation fleet serving a wholesale distribution center:

Transportation Equipment Inventory
- Number of Tractors
- Number of Trailers and Capacities
- Miles per Gallon (Loaded)
- Vehicle Range (Miles per Tank of Gas)
- Vehicle Down Time (Hours per Day)
- Average Loading Time (Hours per Truck)

Driver Information
- Number of Drivers
- Regulatory Constraints on Driver Time

The typical vehicle used in the distribution of dry groceries from wholesale distribution warehouses is a 40,000-pound tractor/trailer combination. This vehicle typically averages four miles per gallon of fuel and carries a 200-gallon fuel tank, giving it a cruising range of 800 miles.

C.2-3.2 Estimating Transportation Stress.

To explore quantitatively the extent of the strain placed on the local delivery system by various preattack evacuation patterns, three different models of the local transportation system have been developed. The purpose of these models is to compute a transportation stress factor, defined as the ratio of post-evacuation ton-miles (or vehicle-hours) to pre-evacuation ton-miles (or vehicle-hours). These models, described in detail in earlier research (F-31) and summarized in Appendix F, vary in complexity and in the amount of detailed information needed to compute the desired stress factor. The three types of stress estimates described in earlier research may be characterized as follows:

(1) Network Models

(2) Population Surrogate Models

(3) Abstract City Models

(1) Network Models -- The most complex model of transportation stress is a network model patterned after the traffic assignment models currently used throughout the United States in local and statewide transportation planning. These traffic assignment models allocate given sets of demand statistics to the links of a specific transportation network. Typically, this allocation is accomplished by assigning the total demand for transportation between any two network nodes to the shortest path separating these nodes. The purpose of the assignment process is usually to ascertain the loading of the various network links and to develop such overall measures of system performance as the number of vehicle-miles or vehicle-hours associated with a particular network configuration or demand pattern.

The network model was first used to determine the additional ton-miles and vehicle-hours necessary to supply food to evacuees in a hypothetical crisis evacuation of the Detroit area (F-12). The model has been programmed for computer analysis and has also been applied in computing transportation stresses in San Jose, California and Richmond, Virginia. It is this model that was used in Section 5.4 of Part One to estimate the transportation stress associated with the crisis relocation plan for Colorado Springs and the State of Colorado.

Necessary inputs to the computerized network model are the location and market share of each major wholesaler serving an area, the number of retail outlets of each wholesaler serving an area, the number of retail outlets of each wholesaler in each zone of the risk and host areas, and a node-link representation of the local highway network. Wholesaler and retailer locations are described as network nodes.

The model discussed above has been revised to meet the specific requirements of this study of food distribution in California. The revised model was used to predict the transportation stress resulting from the shift in the

demand for food under crisis relocation conditions. Census population data gave both normal existing demand and sales capacity. Major distributors reported warehouse supplies, and other supplies were assumed to meet normal demand. Post-relocation demands were predicted on the basis of population shifts and allocated to companies, and finally, shipping patterns were assigned to link supply and demand.

(2) Population Surrogate Models -- The second model of transportation system stress is similar to the network model in most respects. Instead of using actual retail store locations to dictate wholesaler delivery points, however, this model assumes that deliveries are correlated with population distribution. While the use of population surrogates appears to give a suitable estimate of regionwide stress when its results are compared with those of the more elaborate network model, the use of these surrogates obscures differences in the stress borne by individual wholesalers.

(3) Abstract City Models -- The third type of transportation stress model discussed in Appendix F represents an even greater level of abstraction than the population surrogate model. In this case, total risk- and host-area populations are combined with average distance measures to produce rough stress estimates. The need for detailed network models is bypassed entirely by a mathematical expression for transportation stress that recognizes two types of food distribution patterns:

- Distribution from a central point within the risk area; and
- Distribution from a remote point removed from both the risk and host areas. (Such a point might be a larger city in the vicinity of the study area.)

Appendix F provides sample calculations and worksheets to aid the planner in estimating transportation stress using this simplified approach.

C.2-3.3 Estimating Additional Equipment and Personnel Requirements.

The models discussed in Appendix F produce estimates of the increases in vehicle-miles and vehicle-hours associated with food distribution under specific crisis relocation conditions. For planning purposes, these estimates

must be translated in terms of the additional transportation equipment and personnel required to distribute food under these conditions.

Since food distribution managers agree that existing transportation equipment is not used to capacity, it is necessary to estimate the additional usage that might be obtained from this equipment before additional drivers and equipment are obtained from other sectors of the economy. In Section 3.2.5.02 of Part One, a number of labor- and equipment-saving measures were proposed for increasing driver and vehicle productivity under crisis relocation conditions. Some of the measures proposed in Part One would have the effect of increasing vehicle productivity without increasing driver productivity (i.e., relaxing maintenance requirements), while other measures (i.e., relaxing union and DOT restrictions) would primarily increase driver productivity, and still others (i.e., relaxing weight limitations) would improve both driver and vehicle productivity. Table II-3 lists the estimated productivity increases associated with each of the proposed measures. This table, which also appears as Exhibit 3.9 in Part One and is repeated here for the reader's convenience, shows thatthe average potential increase in driver productivity is 51%, while the average increase in productivity possible for existing food transportation vehicles is 112.5%. This figure could range from 76% to 149%, depending primarily on existing vehicle down time.

Figure II-3 (also duplicated in Part One) charts the rough results of Table II-3 as a function of different transportation stress factors. On the average, a transportation factor of 2.5 (i.e., a 150% increase in vehicle mileage) would require an influx of 18% more vehicles and 71% more drivers from other sectors of the economy. These estimates allow for no attrition in the existing driver force in the face of emergencies and assume that the length of the crisis relocation period will be relatively short (one to two weeks). Although Table II-3 was prepared from rough estimates of the likely impact of different measures for improving distribution system productivity, it confirms two of the major intuitive observations of distribution managers regarding emergency operations under crisis relocation conditions:

FIGURE II-3

RANGE OF ADDITIONAL DRIVERS AND EQUIPMENT

ASSOCIATED WITH TRANSPORTATION STRESS FACTORS

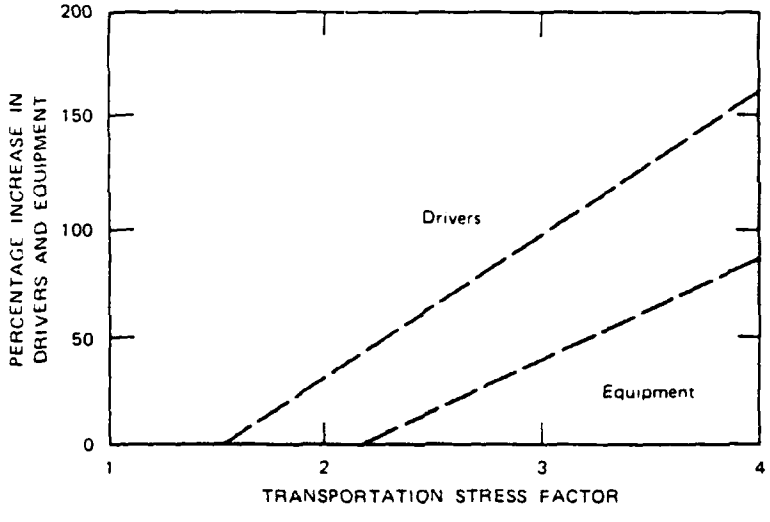

TABLE II-3

SUMMARY OF POTENTIAL PRODUCTIVITY INCREASES

EMERGENCY MEASURE	ESTIMATED PERCENT INCREASE IN EFFICIENCY					
	Vehicle Time			Driver Time		
	Lower	Mid-Range	Upper	Lower	Mid-Range	Upper
REGULATORY CONSTRAINTS						
Relaxing Driver Restrictions	--	--	--	18%	20%	22%
Relaxing Weight Limitations	4%	6%	8%	4%	6%	8%
EQUIPMENT USE						
Minimizing Down Time	37%	54%	71%	--	--	--
Relaxing Maintenance Requirements	15%	17.5%	20%	--	--	--
Eliminating Light Loads	5%	10%	15%	5%	10%	15%
Shipping Only Full-Pallet Loads	5%	10%	15%	--	--	--
Shipping Only Necessary Commodities	10%	15%	20%	10%	15%	20%
TOTAL	76%	112.5%	149%	37%	51%	65%

(1) Driver availability is likely to be more critical than vehicle availability. That is, more additional drivers than vehicles are required to meet a specified increase in vehicle mileage.
(2) The existing distribution system can support a doubling of vehicle-miles for short periods of time without requiring additional transportation equipment.

Because of the rough nature of the estimates used in developing Figure II-3, care should be taken in applying this Figure in crisis relocation planning. Since the Figure was developed by accumulating relatively small increases in productivity, there is no guarantee that the estimates will be valid for relatively large increases in transportation stress. In particular, if stress factors are sufficiently great to give rise to vehicle or driver increases in excess of 100% in Figure II-3, such increases should be carefully checked for plausability by consulting directly with industry personnel and by comparing total vehicle and driver requirements with those of other firms having similar loads and vehicle mileage requirements.

As part of the evaluation of emergency food distribution alternatives for California, it was determined that shipments between major retail chains can assist in relieving transportation stress, and also provide more balanced host-area distribution. It was found, for example, that if Ralph's, with no host-area stores, distributed to Safeway stores, transportation stress is reduced, retail store throughput is increased, and the strain on mass feeding centers is decreased.

In addition to planning for the emergency use of trucks and trailers, it appears that some railcars can also be diverted from less critical use in time of emergency. In California, rail was also indicated as possibly suitable for moving canned goods and dry groceries held in processors' risk-area warehouses to host-area warehouses, secondary distribution centers, intermodal transfer points, or rail sidings. Each rail boxcar has about 1-1/2 times the capacity of a 40-45 foot semi-trailer. Use of rail to carry critical goods could help to relieve highway congestion during relocation.

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